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Intertemporal Excess Burden, Bequest Motives, and the Budget Deficit

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Abstract

Chen aims to empirically determine the significant factors that affect the levels of budget deficits of central governments across time and across countries. He empirically tests two prominent theories of budget deficits—the Barro (1979) tax-smoothing approach, and the still-untested theory of negative bequest motives advocated by Cukierman and Meltzer (1989). The author uses econometric techniques including fixed-effects (both country and time) panel regressions spanning 87 countries over the period 1975 to 1992, and the Griliches treatment of missing data. Chen finds relatively stronger statistical support for the tax-smoothing approach among developing countries but not in industrial countries. The existence of empirical evidence supporting the theory of negative bequest motives is indeterminate. The author also conducted post-regression analyses to assess the proportion of observed differences in budget deficits the factors were actually able to explain. These reveal that both theories are generally weak in accounting for intertemporal changes in budget deficit shares for both industrial and developing countries. The theories performed significantly better in accounting for cross-section differences. The author has many contributions to the literature. First, he analyzes the question of what determines the size of central government budget deficits using cross-country time series data leading into the 1990s. Second, he provides empirical tests of the still-untested Cukierman-Meltzer (1989) negative bequest motive theory of budget deficits. By using the panel data, Chen attempts to determine the factors that influence not only the intertemporal differences in budget deficits but also those factors that lead to cross-country differences. Last but not least, he provides some preliminary evidence that poverty reduction is necessary for long-term government budget deficit reduction.

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INTERTEMPORAL EXCESS BURDEN, BEQUEST MOTIVES AND THE BUDGET DEFICIT

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1. Introduction

The characteristic of the United States federal government budget in the 1950s and 1960s was that of small budget deficits, ranging from 1 to 2 percent of GDP, alternated with occasional surpluses (Figure 1.1). The beginning of the 1970s saw the end to this trend, with the federal government running budget deficits that were not only persistently large, but also generally increasing as a share of GDP. This trend continued until 1993, after which the federal budget made the sudden recovery towards being balanced. This recovery has led to the fiscal year of 1998 to be somewhat historical, with the occurrence of the first budget surplus of the federal government budget in nearly thirty years.

Cross-country time series data surprisingly reveal a substantial number of other developed and developing countries that have experienced a V-shaped trend in their central government budget surplus shares, very similar to that experienced by the United States. However, there are also other countries that, in one way or another, did not conform to the above trend. The above brings one to ask the question that is central to this paper: what determines the size of deficits of national governments?

This paper focuses on empirically determining the significant factors that influence the size of government budget deficits. Possible factors that explain cross-country and intertemporal differences, will be both examined. In particular, it tests two prominent theories of budget deficits, namely the Barro (1979) tax-smoothing approach, and the still largely-untested theory of negative bequest motives advocated by Cukierman and Meltzer (1989). Using a panel data set that includes 87 countries for the time period 1975 to 1992, cross-section and panel regressions are estimated with the variables postulated by the two theories.

Cukierman and Meltzer (1989) developed a theory of budget deficits that focuses on the intergenerational redistributive aspect of government debt. They argue that there exist *bequest-constrained individuals*, who would like to transfer resources from future generations to finance current consumption, via negative bequests. However, given that such negative bequests are not socially enforceable, bequest-constrained individuals will favor any fiscal policy that decreases current taxes without decreasing current government expenditures. Thus, in a democratic political system, the larger the share of bequest-constrained individuals in the population, the more likely is the government to run larger deficits. Based on this scenario, Cukierman and Meltzer postulate that increases in the expected rate of economic growth, the spread of the income distribution or expected longevity tends to increase the population share of bequest-constrained individuals, which will consequently lead to larger budget deficits.

The second model that this paper is concerned with is the tax-smoothing model advocated by Barro (1979). Barro argues that the dominant motive behind the running of budget deficits and surpluses by central governments is the minimization of the deadweight loss associated with tax collection, which requires keeping a constant tax rate for every period. He thus postulates that governments would run budget deficits in periods during which expenditures are unexpectedly high or when the economy is in recession, and vice versa.

The regression results show that the estimated coefficients for unanticipated changes in government expenditures and output are highly statistically significant and of the correct sign for the developing countries, but not for the developed countries. As such, our empirical results show that tax smoothing is an important consideration for running budget deficits and surpluses only for developing countries. In contrast, empirical support for theory of negative bequest motives is rather inconclusive. First, the panel regressions do reveal that the expected growth rate exerts a negative effect on the budget surplus share, which is in accord with negative bequest motives. However, this effect is statistically significant for only developed countries, and not for developing countries. For the Gini coefficient, developed countries exhibit a positive but insignificant coefficient, while the developing countries have an insignificant negative coefficient. Finally, the estimated coefficient of the life expectancy variable is negative but significant for the developing countries, but not for the developed countries.

In summary, the paper has many contributions to the literature. First, it is analyzes the question of what determines the size of central government budget deficits using cross-country time series data leading into the 1990s. Second, it provides empirical tests of the still-untested Cukierman-Meltzer (1989) negative bequest motive theory of budget deficits. By using the panel data, this paper attempts to determine the factors that influence not only the intertemporal differences in budget deficits but also those factors that lead to cross-country differences as well.

Following this introduction, Section 2 will briefly present the global trends in budget deficits since the 1950s. In doing so, it will highlight the interesting puzzles associated with the observed trends. Introduction of the theoretical framework of the Barro's tax smoothing approach will be detailed in Section 3. Section 4 will proceed on to introduce the Cukierman-Meltzer theory of negative bequest motives of budget deficits. Section 5 of this paper will focus on other factors that have been found to significantly influence the size of budget deficits in the literature. Section 6 will present the sources of data, the construction of the variables to be used as regressors in the panel regressions and the results of the regressions. Section 7 will conclude with the main findings of the paper.

2. Patterns and Puzzles

What determines the deficits and debts of national governments? Why should they loom larger at some times and in some countries, and smaller in others? We have partial theories; some explaining changes over time and others addressing the international differences. Yet only now have enough data been gathered to allow global tests of the competing explanations.

Since the 1950s, an ever-growing number of countries have supplied data on government finances. Adjusting and assembling these data makes it possible for this paper to reveal some striking patterns in central-government budget balances and stocks of public debt. Most countries, as we shall see, conformed to some previously unnoted time trends in their government deficits and debts as a share of GDP. Yet countries still varied even more in their surplus shares in any given year than the international averages varied over time.

Both the revealed global movements over time and the contemporaneous differences between countries pose challenges for economic theory. This section surveys the global trends and international differences in deficits that have occurred from 1950 to the early 1990s. Some of the patterns are more puzzling than others, but they all invite new tests of competing theories.

2.1 Patterns: Global Trends

A simple way to grasp the global tendencies in government budget balances and stocks of public debt is to follow simple averages of their shares of GDP over the second half of the twentieth century. Figures 2.1 and 2.2 plot these averages for different groups of countries supplying annual data for long periods. The global tendencies between 1950 and 1999 divide into three clear eras, with a fourth era possibly starting from 1993.

1. From mid-century to 1973

The long initial postwar era was one in which deficits seemed to grow slowly larger on the average, though neither their average size nor the steepness of their trend is as striking as what was to follow. In this period before 1973, only 14 out of 1116 country-years of available data saw deficits as great as 10 percent of GDP. Over the same period, those deficits were small enough in relation to GDP that central-government debt did not rise relative to annual GDP.

For the United States and the United Kingdom, at least, we know that pre-1950 trends also showed no large net deficits over the very long run. To judge from their experience since the late eighteenth century, the only sharp increases in the debt-output ratio came during wars or depressions. Between these sharp increases, the government would run budget surpluses to pay off the debt accumulated, leading to a decline of the debt-output ratio[1].

2. From 1973 to 1983

On the average, central government budgets dropped sharply into deficit from 1973 to 1975 and again from 1979 to 1983, with a slight plateau in between. These drops corresponded, of course, to the two oil shocks. At its worst, the 94-country average budget deficit exceeds 6.3 percent of GDP in 1982. These budget deficits correspondingly led to the steady increase in the debt-GDP ratio, from 26 percent to about 54 percent of GDP. This greater than 100 percent increase in the stock of debt to GDP ratio occurred despite the absence of wars or long-term recessions.

3. From 1983 to 1993

By contrast, this period saw a clear net reduction in deficit shares, with deceleration in the debt/GDP ratio. The recovery pattern was not even, however, with a presumably cyclical relapse into greater deficits between 1990 and 1992. Yet over the whole period, there was a clear reduction in the rate of deficit.

The years after 1993 might eventually be viewed as a continuation of the 1983-1993 recovery. So far the most recent data have brought some further reduction in deficits and an end to the rise of the debt/GDP ratio. Let us keep the post-1993 experience to one side, however, unto the data for these most recent years are completed.

2.2 Patterns: Cross-Sectional Differences

While sharing in the global movements, developed and developing countries, as well as individual countries, varied greatly in their deficits and debt growth. Countries departed from the global averages both in the timing of their turning points and in their average deficit and debt shares during any given time period.

2.2.1 Developed and Developing Country Differences

Figure 2.3 shows separate plots of budget surplus shares for the developed (high-income) and developing (non high-income) countries. We see that prior to the first oil shock of 1973,

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[1] See Elmendorf and Mankiw (1998), Anderson (1986) and Hoover and Siegler (2000).

developing countries were on average experiencing larger budget deficit shares compared to the developed countries. Developed countries were on average running deficits about 1 to 2 percent of GDP; while the developing countries were generally having deficit shares of approximately 2 to 3 percent.

With the onset of the first oil shock in 1973, developing and developing countries alike took the steep dive into larger deficit shares. At their worst, average deficit shares for both groups of countries is larger than 6 percent in 1982-83.

Similar to budget surplus shares plots in Figure 2.1, recovery from the great dive began for both developed and developing countries in about 1983. However, divergent trends for developed and developing countries emerged with the recovery. While the developed countries were able to recover rapidly from the great deficit dive, the recovery was not sustained. After reaching an average deficit share that was a little over 2 percent in 1988/89, the developed countries experienced a relapse and deficit shares steadily increased to nearly 6 percent in 1993. Since then there has been a strong recovery, with the average deficit share for the developed countries being approximately balanced in 1998.

In contrast, the developing countries made a slower recovery from the deficit dive, reaching their pre-dive levels only in the early 1990s. In addition, the developing countries have not, at least based on the available data, suffered a relapse into large deficits, as have the developed countries. In 1994, the average deficit share over 51 developing countries was only 3 percent. What factors could have led to the divergent trends in deficit shares out of GDP between developed and developing countries?

2.2.2 Individual Country Differences

For several countries, the chronology of turning points in the deficit share of GDP differed noticeably from that average pattern shown in Figure 2.1. Some countries did not follow the V-shaped budget trend at all. For example, Finland and Switzerland have been running small deficits since 1950 but then took a sudden dive in the early 1990s. France seems to be in a category on its own. From 1950 to 1973, it was moving slowly from deficits to surpluses, and then it dropped into deficit along with the other countries during 1973-1983. It continued to run even deeper deficits to 1994, before tightening up in an attempt to conform to the Maastricht Treaty's call for deficits within 3 percent. Finland kept balanced budgets, more or less until 1990, then had deficits averaging 10 percent of GDP for the next five years, partly because it attempted to peg its currency to the German mark at exactly the wrong moment in history.

Apart from oddities of timing, some countries stood out over most of the period as having particularly deep deficits and soaring debt/GDP ratios. This was generally true of Belgium, Greece, Ireland, Italy, Israel, Morocco, Oman, Sri Lanka and Zambia, whose deficits were often over 10 percent of GDP. Why these countries and not others?

2.3 Puzzles and Questions

Based on the observed similarities and differences in the trends of government budget surpluses from above, one would naturally ask the following questions:

1. What factors could have caused the United States and the other countries to exhibit the V-shaped budget surplus trend? More simply, what were the factors that caused the government budgets of these countries to suddenly deteriorate in the peacetime years of the early 1970s and what factors caused the just as sudden recovery in the 1990s? Why did the historically deep budget deficits persist for a period of two decades of peace?
2. What are the differences between developed and developing countries such as to lead them to exhibit divergent trends in deficits shares?
3. Why did some countries exhibit the V-shaped government budget trend and others did not? Are there are economic differences between the countries that exhibited the trend, and those that did not?
4. Why have some countries been able to run persistent budget surpluses like Singapore, while other countries, Belgium and Italy for example, run persistent deficits so much so that their debt to output ratio is more than 110 percent?

This paper is set to seek answers to the above questions.

3. The Tax-Smoothing Approach to Budget Deficits

This section examines closely Barro's Tax-Smoothing Approach to budget deficits. It reinforces the ideas behind the main implications of the approach by providing a more detailed explanation of the theoretical framework and assumptions. In addition, it also provides a brief survey of the literature that focuses on the previous testing of the model.

3.1 The Theoretical Framework

Assuming that Ricardian equivalence holds to a first-order approximation, Barro (1979) proposed and tested a tax-smoothing theory of public debt, which is based on society's attempt to minimize the excess burden of taxation over time. Although the amount of deadweight loss accrued due to taxation depends on the timing and composition of tax collections, Barro, in this paper, only focuses on the minimization of the deadweight loss of taxation due to the timing of tax collection.

The Ricardian proposition implies that shifts between debt and tax finance for a given amount of public expenditure would have no first-order effects on real macroeconomic variables. The assumption that it holds excludes some of the typical features of public debt analysis, such as shifting of the tax burden to future generations and the crowding out of private investment, etc. As such, Barro's model abstracts from the intergenerational reallocation of resources as a reason for the issuance of public debt[2].

The theory focuses on a closed economy without capital in which a large national government that has jurisdiction over a population of given size, in which any effects of public debt policy on migration[3] is ignored. The government needs to finance a certain amount of expenditure in every period by means of current income taxation and public debt issue[4], with both the composition of taxes and the level of government expenditure being exogenously given[5]. Individuals are assumed to have perfect knowledge of all future exogenous variables, including the levels of government expenditure. Also assumed is that the real rate of return on public and private debts is a constant.

Due to costs for tax administration and enforcement, the collection of tax revenues results in some deadweight loss or excess burden. In accordance with public finance theory, Barro assumes that the deadweight loss for each period is directly proportional, with a positive second derivative, to the amount of tax revenue collected and inversely proportional to the available tax base. The government has an intertemporal budget constraint implying that the present value of spending must equal the present value of taxes.

The government's optimization problem is then to choose the amount of tax to be collected in each period such that the present value of deadweight loss is minimized, subject to the government's intertemporal budget constraint. It can be shown that the present value of the deadweight loss of tax collection is minimized when the (average) tax rate[6] is constant in every

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[2]Such features of public debt analysis are considered in Cukierman and Meltzer (1989), which is discussed in Section 4.

[3]This would be an important consideration for a local government.

[4]Note that currency issue as a method of financing government expenditure is not considered by Barro.

[5]Assuming that the level of government expenditure is exogenous implies that Barro's model does not deal with the determination of the size of the public sector.

[6]Barro defines the tax rate as the ratio of the amount of tax revenue collected to the available tax base.

time period, with the level of the tax rate being determined by the intertemporal budget constraint.

Suppose that the United States federal government is initially running a balanced budget and then government expenditures increase unexpectedly due to, say, a sudden outbreak of war with Iraq. The balanced budget rule would advocate that taxes to be temporarily increased during the duration of the war, so that additional revenue can be collected to offset the additional military expenditures that are incurred, and to revert back to the original level of tax collections once the war is over. However, note that since the tax base, at least in the short run, remains unchanged, tax rates would increase significantly during the war and then decrease significantly after the war.

The tax-smoothing approach will, instead, prescribe a near constant tax rate. That is, it will propose that taxes be increased by an infinitesimal amount at the onset of the war and then held constant thereafter (even after the war has ended). Thus, assuming that the tax base remains unchanged, a deficit would result during the war and a surplus after the war. The budget surplus will compensates for the deficit during the war, and therefore the inter-temporal budget constraint is not violated.

Note that compared to the tax smoothing policy, the balanced budget policy incurs a higher level of excess burden during the war, because of the higher tax rate, but a lower level of excess burden in the after the war due to the relatively lower tax rates. Overall however, the tax smoothing policy dominates because under the balanced budget policy, the additional tax distortions that are incurred during wartime exceed the additional welfare gains of the lower tax rates in postwar period. This is due to the assumption of the positive second order derivative of the deadweight loss function with respect to the level of tax revenues collected. It thus follows that under the tax smoothing policy, budget deficits and surpluses are used as a buffer, optimally to minimize the distortionary effects of taxation, given a certain path of spending. As such, when spending is temporarily high, it will be optimal for the government to run a budget deficit in order to keep the tax rate constant and budget surpluses when spending is temporarily low.

An important extension of this principle concerns the fluctuations of tax revenues due to the business cycle. Suppose the economy experiences a temporary recession, in which output is low in the first period and goes back to its normal level in the second time period. The tax-smoothing approach dictates that, because of constant tax rates, that tax collections be reduced during the recession, which would result in a budget deficit, given an unchanged level of government expenditure. On the other hand, when an economic boom occurs, it would be optimal for the level of tax revenue collected to be proportionately increased, resulting in a budget surplus. As such, with regard to output fluctuations, the tax smoothing approach advocates a cyclically adjusted, balanced budget rule: the budget should be balanced over the business cycle, but not every fiscal year.

In summary, the tax-smoothing approach postulates governments run budget deficits and surpluses in an effort to minimize the deadweight loss of taxation by keeping the tax rate constant. It argues that governments will run budget deficits in the face of unanticipated shocks such as increases in government expenditures or decreases in output. Conversely, during periods of normal levels of government expenditure and output, governments will be running budget surpluses. As such, the tax-smoothing approach postulates that there exists a positive relationship between unanticipated changes in government expenditure and the budget deficit, and a negative relationship between unanticipated changes in output and the budget deficit.

3.2 Previous Tests on the Tax-Smoothing Approach

Barro (1979, 1987) tested the tax-smoothing model for the United States and the United Kingdom and concluded that tax-smoothing behavior was a dominant reason for the running of budget surpluses and deficits for both countries. Using U.S. data from 1917 to 1976 and British data from 1706 to 1918, he found that both American and British experiences are generally consistent with the basic principles of tax-smoothing: the debt-to-GNP ratios increase during wars, decrease in peacetime, and fluctuate with the business cycle.

Roubini and Sachs (1989b) argues that if a government was being true to the tax-smoothing approach, then the observed path of tax rates is likely to follow a mean-zero random walk. This is because governments that attempt to follow the constant tax rate rule would only perform adjustments to the tax rate with the arrival of new information regarding future government expenditures and/or tax revenues. It seems reasonable to assume that such new information would arrive in a random fashion, resulting in seemingly random adjustments to the tax rates, consequently leading to the tax rate following a mean-zero random walk. Having a null hypothesis of a pure random walk for tax rates, versus an alternative hypothesis in the tax rates have a constant non-zero drift. They found that for the period 1960-1986, 12 out of 15 OECD countries reject the null hypothesis, with the United States, United Kingdom and Finland being the exceptions. As such, they concluded that Barro's findings for empirical support for the tax-smoothing approach using data for the U.S. and the U.K., proved to be exceptions rather than the rule. However, Sahasakul (1985) also rejected the random walk model for taxes for the case of the United States when he found that other variables could help predict future changes in U.S. tax rates.

Recall the efficiency rule that called for the various taxes to be levied to the point where the deadweight loss per dollar of marginal tax revenue is equalized across the available array of taxes. Given that seigniorage financing is a kind of (implicit) tax and assuming that minimization of the deadweight loss of taxation is a goal of the tax authorities, Mankiw (1987) suggested a rising path of total revenues relative to GDP should be met by a rise both in explicit taxes rates and a rise in the inflation taxation. As such, inflation and tax rates should be positively and significantly correlated. He tests this proportion by examining the correlation of explicit tax rates and the inflation rate (which is taken as a proxy of the tax rate on real money balances). Using U.S. data, he finds a positive and significant hypothesis.

Roubini and Sachs (1989b) extend Mankiw's test to the other industrial countries. They find no general support for the hypothesis. For 12 out of the 15 countries, there is no significant relationship between tax rates and the inflation rate. In addition, for 5 out of the 12 countries (France, Austria, Italy, Ireland and Denmark), the sign of the regression coefficient is wrong, implying that inflation and tax rates are negatively correlated. However, they do find that the hypothesis holds for the United States, Finland, and the Netherlands.

Roubini (1991) tested the tax-smoothing approach by applying Mankiw's test to data from 92 developing countries for the period 1950-88. He found positive and significant (at the 5 percent level) correlations between inflation and tax rates for only 15 out of the 92 countries. The correlation was positive but not statistically significant in 37 countries and negative in 40 countries.

Another implication of the tax-smoothing approach is that the real budget deficit should be only a function of transitory shocks to output and government spending. Roubini (1991) also tested this hypothesis using data for 48 developed and developing countries for the 1970-87 period. The measure of fiscal deficit used was the nominal overall deficit of the consolidated government as a share of GNP. As a proxy for the cyclical component of output, he took the growth rate of real GNP; the idea is that in a period of economic slowdown or recession the output growth will be low or negative signaling a transitory fall in output[7]. The share of government spending to GNP (excluding interest payments) was used as a proxy for the transitory component of spending. He found evidence that increases in government spending to GNP leads to an increase in fiscal deficits. More specifically, all 48 countries return a coefficient that was of the right sign and was statistically significant. However, he found little evidence of an effect of

[7] We note that the GNP or GDP growth rate is a rather inappropriate proxy for the cyclical component of output. This is because it is possible for high output growth to be experienced even when the economy is well below potential GDP, like during the recovery phase of the business cycle.

shocks to output growth on the fiscal deficit. Only 8 countries had coefficients for the growth variable that were of the correct sign and were statistically significant.

4. The Negative Bequest Motive Theory of Budget Deficits

The tax-smoothing approach focuses only on the second-order effects of the deadweight loss due to taxation. It ignores any first-order intergenerational redistribution effects of public debt due to its underlying assumption of Ricardian Equivalence. However, Ricardian Equivalence hinges on the assumption that individuals wish to make positive and significant bequests to their heirs[8]. Buchanan and Roback (1987) have argued that even in the absence of fiscal illusion, positive intergenerational bequests cannot be taken for granted. They claim that many individuals would actually like to make "negative bequests" by leaving debts to be paid off by their heirs rather than by themselves. Current American law limits the obligation of descendants to payoff the private debts of deceased relatives, but public debts incurred by the government may become the legal obligation of future generations of citizens. Therefore, public debt may provide the opportunity for intergenerational transfers from children to parents that cannot be done through incurring private debt.

In light of the above, Cukierman and Meltzer (1989) focused on intergenerational redistributive effects of public debt, and proposed a political economy, general equilibrium model of debt and deficits based on intergenerational transfers. They argue that there exist *bequest-constrained individuals* who would like to transfer resources from future generations to finance current consumption, via negative bequests. As mentioned, since such negative bequests are typically not socially enforceable, bequest-constrained individuals will favor any fiscal policy that decreases current taxes without decreasing current government expenditures. Thus, in a democratic political system, the larger the share of bequest-constrained individuals in the population, the more likely is the government to run larger deficits. Based on this scenario, Cukierman and Meltzer theory of negative bequest motives postulate that increases in the expected rate of economic growth, the spread of the income distribution or expected longevity tends to increase the population share of bequest-constrained individuals, which will consequently lead to larger budget deficits.

[8]The notion of Ricardian Equivalence first assumes that given sufficient intergenerational altruism, the finite horizon of each generation becomes immaterial, since such altruism creates links across generations resulting in one implicit generation with an infinite horizon. Given this, Ricardian Equivalence postulates that the choice of how to finance a given level of government spending is irrelevant, as a first approximation. In particular, the distribution of the tax

4.1 The Theoretical Framework

Cukierman and Meltzer (1989), hypothesizing a political theory of government debt and using an overlapping generations model with bequests, attempted to identify the factors that determine the size of budget deficits by focusing only on the redistributive role of the government. By doing so, they abstract from the function of the government as a provider of public goods and also from issues that relate to the minimization of the deadweight loss of taxation over time.

Main Assumptions of the Model

The economy is represented by an overlapping generations structure with bequests. The population is assumed to be stationary and the number of individuals in each generation, denoted by N, is identical across periods. Their model assumes there is no uncertainty, taxes are levied in a lump-sum fashion on the young, and the old receive Social Security benefits. Individuals work only when young and each supplies inelastically one unit of labor each period. There exists differences in ability and, consequently, in wage rates across individuals. The production function exhibits constant returns to scale technology.

Individuals are able to transfer wealth from the first to second period of life by means of savings either in the form of government bonds or capital investment. Familial intergenerational transfers, if any, are assumed to flow only from the parent to the child, that is, such transfers exist only in the form of bequests. The amount of bequests differs across individuals. As will be explained below, the position of each individual in the distribution of wealth, his wage rate and the wage rates he expects for future generations in his family determine his attitude toward the size of the budget deficit. Given individual preferences, majority rule determines the current period debt size and the current taxes chosen by voters.

Government expenditure is financed by a combination of lump-sum taxes on the young and issuance of one-period government bonds that have to be repaid with interest in the next period. The government budget constraint therefore implies that total current expenditure, consisting of social security payments plus the principal and interest payments on last period's government bonds, must be equal to total current revenue, consisting of the above mentioned lump sum taxes and new bond issue. The government budget constraint, normalized by the number of young or old individuals, N, can be thus written as:

burden across generations is not influenced by the size of the debt: changes in public debt are compensated by changes in private bequests.

$$S_t + (1 + r_{t-1})b_{t-1} = T_t + b_t \qquad (1)$$

where

S_t	is the social security payments paid out to the old in period t
r_{t-1}	is the interest rate for period t-1
b_{t-1}	is the amount of bonds issued in period t-1[9]
b_t	is the amount of bonds issued in period t
T_t	is the amount of taxes levied in period t

Rearranging, we get the size of the budget deficit,

$$b_t = S_t + (1 + r_{t-1})b_{t-1} - T_t \qquad (2)$$

which also denotes the stock of government debt in period t, since all bonds are one-period bonds.

Bequest Motives and Preferences over the Budget Deficit

Cukierman and Meltzer argue that Barro's (1974) government debt neutrality theorem does not hold when individuals differ in productivity, wage earnings, and also in their initial endowment. This is because these differences will give rise to some individuals who would like to leave a negative bequest to their descendants. However, such bequests cannot be discharged, as there are no institutional arrangements that can obligate their descendants to do so. The minimum bequest is thus constrained to zero and individuals who desire to leave negative bequests are termed as *bequest-constrained individuals*.

Clearly, such bequest-constrained individuals will favor a fiscal policy that increases their lifetime income at the expense of future generations even when the present value of the tax change is zero. For example, increased Social Security benefits financed by debt issue shift taxes forward (that is, into the future) and allow bequest-constrained individuals to achieve a higher level of consumption. Thus, with such individuals, the issuance of government debt will not be neutral. All other things equal, under a majority rule political system, this implies a larger share of the population that is bequest-constrained will tend to lead to a larger budget deficit.

Cukierman and Meltzer further argue that, in their general equilibrium framework, even an individual who is not bequest-constrained, and does not possess negative bequest motives, may still not be indifferent to a reallocation of resources over time that maintains present value. According to them, if there exist any bequest-constrained individuals in the economy, a present-value-preserving exchange of taxes for public debt will increase the consumption of those individuals. These bequest-constrained individuals must obtain the required resources for additional consumption from the non-bequest-constrained, who substitute bonds for real capital in their portfolios. While bonds and capital are perfect substitutes in portfolios, they are not perfect substitutes in production. The additional debt crowds out some capital[10], raising the return to capital and decreasing the return to labor. Consequently, individuals will favor a debt increase if their income is largely capital income and will be against a debt increase if their income is mainly labor income. As such, even non-bequest-constrained individuals may not be indifferent to such intertemporal reallocations of resources that maintain present value[11].

Given the above arguments, whether individuals favor a larger budget deficit depends on three factors:

1. the amount of benefits they receive from an intergenerational reallocation of resources (relevant only to bequest constrained individuals),
2. the magnitude of the increase in welfare they obtain from a higher return on assets, and
3. the magnitude of the decrease in welfare they experience from a decrease in wage rates.

These factors will consequently also determine the proportion of individuals in the economy who will vote for a larger budget deficit. Under a majority rule system, a larger the proportion of such individuals will therefore lead to a larger budget deficit.

4.2 Major Implications: Macroeconomic Conditions Conducive to Larger Deficits[12]

Based on the above three factors, Cukierman and Meltzer came up with the following economic conditions which tend to increase the size of the budget deficit[13] under a majority rule political system. These constitute the refutable hypotheses of their model.

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[9] Note that all government bonds issued are one-period bonds. This implies that bonds issued in the preceding period must be retired and repaid in full with interest in the next period.

[10] The amount of capital that is crowded out by an additional unit of debt depends on the fraction of bequest-constrained individuals in the economy and on the extent to which they are constrained.

[11] It is realized that for small open economies, the issue of addition government debt will not lead to an increase in interest rates and thus no crowding out of capital will occur. This point will be reiterated in a later section when the regression results are analysis.

[12] In their paper, Cukierman and Meltzer presented one proposition for the macroeconomic conditions that are conducive to larger debts and another proposition for the macroeconomic conditions that are conducive to larger deficits. Given that, debt equals deficits in their model (due to the assumption of one-period bonds), both propositions, in fact, are equivalent.

[13] Recall that since the entire budget deficit is assumed to be financed by the issuance of one-period bonds in the model, the size of the deficit in period t will exactly equal the amount of debt issued in period t, which also equals the stock of debt in period t.

Proposition: *Budgetary deficits are larger under majority rule*[14],

a. *the larger the expected rate of future growth of the economy,*

b. *the larger the fraction of individuals below a certain level of income and wealth*[15],

c. *the larger the fraction of individuals whose main source of income is NOT from wages*[15],

d. *the larger the spread of the distribution of income*[15], *and*

e. *the higher the expected longevity*

Explanation of Proposition:

a. All other things being equal, the higher the expected rate of future economic growth, the more the current generation will expect future generations to be relatively better off. This tends to increase not only the probability that the current generation will want to reallocate resources from the future to the present, but also increases the amount of resources that is likely to be transferred. As such, economic growth tends to increase the number of individuals with negative bequest motives and also increases the degree to which individuals are bequest constrained, thus leading to a larger budget deficit under majority rule.

b. Cukierman and Meltzer argue that individuals who are below a certain level of income and wealth will have not enough resources for a subsistence level of lifetime consumption. As such, these individuals would tend to want their descendents to aid them in achieving a higher level of lifetime consumption, thereby giving rise to negative bequest motives. Thus a larger fraction of the population being poor, or at least under that certain level of income and wealth, tends to increase the fraction of the population that are bequest-constrained and this consequently leads to a larger budget deficit.

c. As argued above, wage rates tend to decrease with debt issuance. As such, individuals with labor income as their main source of income will tend not to favor a larger amount of debt issuance, which is equivalent to a larger budget deficit. Thus, a larger fraction of the population that does not have wages as their main source of income tends to increase the level of the deficit that preferred by the median voter.

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[14] Note that these conditions for larger deficits are not based on rigorous mathematical derivation. In fact, they are intuitive implications of the comparative statics that were derived in their mathematical model. For example, (e) suggests that a higher expected longevity, ceteris paribus, tends to increase the size of the budget deficits. However, we note that differences in longevity have not been incorporated into their two-period overlapping generations model.

[15] It will be explained below that with parts *b* and *c* of the Proposition, part *d* becomes redundant.

d. Cukierman and Meltzer argue that individuals with extreme amounts of income and wealth tend to favor more debt issuance. Individuals with low incomes will tend to be bequest constrained, while individuals with high incomes tend to have capital income as their main source of income. Both of these groups of individuals will vote for more debt financing, but for different reasons. Hence, the larger the spread of the distribution of income or total wealth, the larger the probability of having a larger budget deficit.

Further, note that part *d* of the proposition is in fact a combination of parts *b* and *c*. Part *b* accounts for the individuals with very small amounts of wealth and income, while part *c* accounts for individuals with very large amounts of wealth and income. Given this, parts *b* and *c* renders part *d* of the proposition redundant. However, suitable cross-country time series data that measure the aspects of the population mentioned in parts *b* and *c* is unavailable. As such, data on income distribution, relevant for part *d* of the Proposition, will be used in lieu of the unavailable data for parts *b* and *c*.

e. Higher expected longevity tends to increase the expected length of time an individual spends in retirement[16]. This tends to increase the required amount of resources necessary to sustain consumption in the retirement years. Thus a higher expected longevity will tend to increase the proportion of the population who prefer negative bequests and also the size of the negative bequest that is preferred. This, in turn, tends to lead to a larger budget deficit, ceteris paribus.

In short, the Cukierman-Meltzer negative-bequest motive theory of budget deficits can be reworded slightly as postulating that budgetary deficits will be larger under majority rule,

i. *the larger the expected long-run growth rate of the economy*

ii. *the larger the spread of the income distribution*

iii. *the higher the longevity*

4.3 Previous Tests of the Theory of the Negative Bequest Motives

The theory of negative bequest motives is still largely untested. To date, there has yet to be an empirical test of the theory of negative bequest motives at the cross-country level.

For the United States, Clingermayer (1991) performed a test of the bequest motive model using U.S. cross-state data. Using a simple OLS regression, he tests the bequest-constrained hypothesis using cross section data on long term debt financing by the American states in the mid-1980s.

To proxy for expected economic growth, he uses two measures: (i) the number of employed persons in each state in 1984 divided by the number employed in 1979, and (ii) per capita annual money income in 1983 divided by per capita annual money income in 1979. He uses the percentage of the state's population that is 65 and over as a proxy expected longevity. Two different dependent variables were used: (i) the average of per capita new net long term debt (i.e., the new debt issued minus the amount of such debt retired) divided by total tax revenues for three years (1985-87), and (ii) the average of new net long term debt per capita for 1985-87.

He finds that the elderly share has a strong negative effect on the two measures of state debt (as longevity increases, the amount of public debt decreases), while the expected growth rate variables have a statistically insignificant effect.

There are a few potential problems with Clingermayer's simple test of the bequest motive theory. Firstly, his two measures of expected economic growth are too "short-run". Recall that that the theory postulates that if the expected growth rate is high, then the current generation will expect future generations to have a relatively higher standard of living and will thus favor a budget deficit. As such, the measure of expected economic growth should be a measure of *long-run* economic growth. Next, the regression specification ignores the bequest motive theory's postulation that the spread of the income distribution affects the level of public debt or budget deficit, which may lead to an omitted variable bias. Finally, the use of the elderly share to proxy for longevity is inappropriate on two counts. It is well known in the demographic literature that the decline in the fertility rate, rather than the increase in the mortality rate, is the dominant cause for population aging. As such, the elderly share may have increased without any change in expected longevity. Secondly, a person living 10 years past the age of 65, on average, tends to consume the more resources than 10 persons surviving up to 66 years (one year past the age of 65). The reason being that one's consumption of resources (especially medical resources) increases rapidly as one advances in age.

5. Other Variables and the Budget Deficit

Before an empirical investigation into the issue of whether bequest constrained motives are significant driving forces behind the size of a country's budget deficit can be carried out,

[16] Thus the case in which higher longevity increases the length of an individual's working life is not considered.

other structural and political variables that influence the size of the deficit must be first accounted for. There are three other main classes of variables that have been suggested in the literature to have significant effects on the size of the budget deficit of a country. They are

1. structural variables that determine or reflect the level of efficiency of the tax system in a country,
2. macroeconomic variables, and
3. political variabes representing the level of political instability and political polarization in a country.

5.1 The Efficiency of the Tax System

The efficiency of the tax system has been emphasized by Edwards and Tabellini (1991) and Cukierman et al. (1992) as an important determinant of the size of the budget deficit. They noted that an economy with an inefficient tax system, holding other factors constant, cannot collect as large an amount of tax revenues as an economy with an efficient tax system. This is primarily because an inefficient tax system has higher costs of tax collection and administration, not to mention more widespread tax evasion. Because of this lower level of tax revenues, economies with inefficient tax systems tend to have larger (and more monetized) budget deficits as compared to economies with efficient tax systems for any given level of government expenditure. The taxation capacity of a country is technologically constrained by the structure of its economy and its stage of economic development. As such, factors influencing the level of efficiency of the tax system in a country can be grouped into two categories[17]: variables that account for the sectoral composition of GDP, and the stage of economic development.

The agricultural sector might be the hardest sector of the economy to tax. Its typically non-corporate structure facilitates tax evasion. Therefore, the larger the relative size of the agricultural sector in an economy, the higher the costs of administration and enforcement of tax collections will be. This implies a less efficient tax system, thus leading to a larger budget deficit for a given level of government expenditures.

On the other hand, the manufacturing sector is generally regarded as one of the easiest to tax. This is because, in sharp contrast to the agricultural sector, the manufacturing industry is largely corporate in structure, making it less capable of tax evasion. Thus, when an economy has a relatively large manufacturing sector, it should face lower tax enforcement costs implying a more efficient tax system, and consequently it should have a smaller budget deficit.

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[17] See Cukierman *et al.* (1992) and Edwards and Tabellini (1991).

A third sectoral share, imports plus exports as a fraction of GDP, measures the foreign trade sector of the economy. Import and export taxes are commonly regarded as a cheap tax base because they are relatively easy to assess and collect since such foreign traded commodities must pass through a limited number of frontier ports, and are usually handled by a few wholesalers. The ease of collecting such taxes is one reason why countries with extensive foreign trade typically collect a greater proportion of public revenues in the form of import and export duties than countries with limited external trade (Todaro, 1997). As such, an economy with a larger foreign sector, ceteris paribus, should be able to collect more tax revenue thus leading to a smaller budget deficit.

Finally, since tax collection costs are likely to be smaller in urban areas than in rural areas. As such, the higher the urban population share out of the total population should be negatively associated with the budget deficit.

5.2 Macroeconomic Variables

5.2.1 Level of Economic Development

To control for the potential effects of economic development on the cross-country differences in budget deficits, several different measures of the level of per capita real GDP will be used. Possible measures include real GDP per capita and a measure of potential or trend real GDP per capita. Detailed description of the construction of these variables will be given in the relevant sections.

5.2.2 Accounting for Money Creation

The budget deficit can be defined as the sum of the different ways in which it can be financed. Typically, budget deficits can be financed either by borrowing from the public or by seigniorage[18], which implies that the budget deficit can be written as:

[18]Note that there are countries for which the budget deficit is not equal to the sum of the debt issued or retired and the amount of money created. For example, Singapore has been generally running budget surpluses since the 1980s; however, its stock of government debt has been increasing. This implies that the Singapore government has chosen not to pay off debts that it owes to the public, even though it has the surpluses to do so. In fact, it has chosen to borrow even more, in spite of accumulating large government reserves due to the many years of budget surpluses. This interesting case of Singapore, which provides a contradiction to the above "identity", illustrates that it is not always the case that when a country runs a budget surplus, the stock of national debt should, ceteris paribus, decrease and vice versa, which is clearly assumed by Cukierman and Meltzer here and by many others in the literature. The above equation perhaps should be rewritten as:

Budget Deficit = Non-monetized Debt Issue + Money Creation - Change in Government Assets

Changes in government assets were not controlled for due to a lack of available data and because changes in government assets is in many ways similar to debt issue, within the framework of the negative bequest motive model.

Budget Deficit = *Non-monetized Debt Issue* + *Money Creation*

The bequest motive theory of budget deficits hinges wholly on the assumption that the deficit is financed by public debt issuance. Therefore, if a country runs a large budget deficit and finances it by monetizing it, the bequest motive theory provides no explanation as to why the budget deficit should arise. This is because monetization of the deficit is equivalent to the imposition of an inflation tax, and this leads to a decrease in the real disposable income that should result in an increase the degree to which people are bequest-constrained. Thus, bequest-constrained individuals would not favor an increase in the budget deficit that is financed by money creation.

As such, when testing the bequest motive theory of budget deficits, it is necessary to control for the seigniorage-financed portion of the deficit, leaving the component of budget deficit that has been financed by debt issuance to be explained by bequest-constrained motives[19]. Following Roubini (1991), I use the change in the monetary base (as a share of GDP) to control for seigniorage revenue.

5.2.3 Accounting for Interest Payments on Government Debt

Interest rates are an important factor in determining governments' costs of debt servicing. Naturally, the costs of debt servicing become more important in countries that have a large stock of government debt, such as Belgium, Ireland and Italy. I will use the measure of the budgetary costs of higher interest rates presented in Roubini and Sachs (1989b), which is the annual change of the difference between the real interest rate and the real growth rate, multiplied by lagged debt-GDP ratio.

5.3 Political Instability

Political instability has been found to play significant roles in the determination of the size of the budget deficits[20].

Bequest constrained individuals should be indifferent between budget deficits that are financed by public debt issue or by sale of government assets, since in both cases current consumption increases at the expense of future generations.

[19]Roubini and Sachs (1989a) showed that there is some evidence that policymakers treat seigniorage and bond issues as alternative ways to finance a budget deficit. Thus if some countries are constrained in their use of seigniorage taxation, they would switch to debt issuance to finance a given level of level of budget deficit. It is clear that in such a case, even if the budget deficit is financed by public debt issue, the Cukierman-Meltzer model does not provide an explanation for such a component of the budget deficit. Roubini and Sachs (1989a) argue that due to their commitment to peg to the Deutsche Mark, member countries of the European Monetary System (EMS) experienced a reduction in seigniorage collections as they induced a slowdown in inflation and they found evidence that the decrease in seigniorage financing was accompanied by a more rapid increase in public debt.

[20] See Cukierman *et al.* (1992), Edwards and Tabellini (1991), and Roubini (1991). These papers actually argue that both political instability and political polarization are significant determinants of the size of budget deficits. However,

Edwards and Tabellini (1991) postulate that the more politically unstable a country is, the larger will be its budget deficit. Political instability will raise the frequency of government changes and lower the likelihood that a current policymaker will be reelected. Given this, consider a policymaker who is required to choose both the intertemporal profile of spending and taxes as well as how to allocate the resources acquired by issuing debt. Suppose that because of political instability in the country, the policymaker is aware that in the future he may be replaced by a policymaker or political majority with different preferences about some aspects of fiscal policy. Then he realizes that, whereas he is in control of how to allocate the proceeds of his borrowing, the allocation of the burden of repaying the debt in the future may not be under his control. This asymmetry may prevent the current policymaker from fully internalizing the costs of running a deficit, the more so the greater is the difference between his preferences and the expected preferences of the future majority. In simple terms, the policymaker may wish to borrow in excess of the optimum and let his successors "pay the bills". Thus, political instability and polarization tends to lead to a larger than optimal size of the budget deficit, even if the policymaker and the voters are rational and forward-looking.

Cukierman *et al.* (1992)[21] provides an alternative explanation of why political instability tends to increase the size of a country budget deficit. They postulate that the evolution of the tax system of a country depends not only on its economic structure but also on the features of its political system, and that political instability tends to lead to an inefficient tax system.

Noting that an existing tax system acts as a constraint on the revenue-collecting policies and hence the fiscal policies of the current government, they argue that tax reforms[22] may be strategically determined: a tax system may be designed by taking into account how well it will constrain the fiscal policies of future governments. In particular, a government may deliberately refrain from reforming an inefficient tax system, for fear that a more efficient tax apparatus will be used by future governments to carry out spending or redistributive programs that the current government disapproves of. Since government changes are more likely in countries with more

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it is noted that a country that is politically polarized may not be politically unstable. For example, a country can have two very different or polarized political ideologies and yet be politically stable if the supporters of one of the political ideology form the vast majority of the voter population, assuming majority rule. For this reason we have decided to omit the concept of political polarization in our presentation of political instability as a significant determinant of budget deficits.

[21]Note that Cukierman *et al.* (1992) found that political instability and polarization are significant determinants of seigniorage and not budget deficits. However, their finding is still relevant to this study for two reasons. Firstly, seigniorage typically implies a budget deficit exists and secondly, they argue that political instability and polarization in a country tends to lead to a more inefficient tax system. The effect of the efficiency of a tax system on the budget deficit was discussed above.

[22]A tax reform is the broad design of a tax system that determines the available tax bases and the technology for collecting taxes.

unstable political systems, such countries tend to have inefficient tax systems and hence larger budget deficits.

This paper will use the frequency of government crises to proxy for political instability[23]. The number of government crises is defined as the number of major government crises, defined as any rapidly developing situation that threatens to bring the downfall of the present regime – excluding situations of revolt aimed at such overthrow.

5.4 Political Freedom

Recall that Cukierman and Meltzer rely on the majority rule or a democratic political system for their theory of budget deficits. Thus, it is important to control for time periods during which citizens of a country may not have the political freedom to vote, such as when a country is under a military dictatorship.

6. Testing the Bequest Motive Theory and the Tax-Smoothing Approach to Budget Deficits

In this section, I will focus on the empirical analysis of the bequest motive and the tax-smoothing theories of budget deficits. The sources and definitions of the raw data collected for the empirical exercise is first presented. The description of the construction of the dependent and explanatory variables used in the regression will follow. Finally, the empirical results of the fixed-effects panel regressions will be presented with the interesting implications highlighted.

6.1 Description of Data

The intended coverage of the regression is from 1950 to 1995 and covers 87 countries. The complete list of countries is presented in the data appendix. Table A.1 presents the sources and definitions of all raw data collected.

[23] It was originally intended to follow Edwards and Tabellini (1991) and Roubini (1991) in using the frequency of government changes (both regular and irregular) as a measure of political instability. However, the data series for the frequency of government changes or total executive transfers obtained from Taylor (1985) is short, ending in 1983. As such, the number of government crises is used as a substitute. This alternative measure is crude since a government crisis does not necessarily lead to a change in the government. In addition, this measure excludes situations of revolt to overthrow the government, which should be included in a measure of political instability.

6.2 Definition of Variables

Dependent Variable

The fiscal surplus of the central government as a share of GDP in year *t* is defined as the ratio of central government budget surplus or deficit (-) in year *t* to nominal GDP in year *t*.

Independent Variables

<u>Structural Regressors (Control Variables)</u>

1. *Index of political rights in year t.* The index runs from "1" to "7", with "1" denoting the highest level political rights or most political freedom.
2. *Agricultural share in year t* = ratio of the value added in the agricultural sector in year *t* to nominal GDP in year *t*.
3. *Manufacturing share in year t* =ratio of the value added in the manufacturing sector in year *t* to nominal GDP in year *t*.
4. *Trade share in year t* = ratio of the sum of imports and exports in year *t* to nominal GDP in year *t*.
5. *Urban population share in year t* = ratio of urban population in year *t* to total population in year *t*
6. Political instability in year *t* = number of government crises in year *t*
7. Development variable : per capita real GDP in year *t*

The measurement of per capita real GDP needs to be comparable across countries. For this reason, data for this variable was obtained from the Heston-Summers data set "Penn World Tables Mark 5.6" (Heston and Summers, 1991)[24]. The measure of real GDP used in this paper will be real GDP per capita measured in constant dollars that has been adjusted for changes in the terms of trade, using 1985 international prices for domestic absorption (consumption, investment and government purchases) and current international prices for exports and imports. This measured was devised to take account of changes in the value of the country's output arising from changes in its terms of trade as well as changes in its production. The domestic absorption part is calculated using 1985 international prices. However, the net foreign balance is valued in current prices instead of 1985 prices. This is to allow for the part of the country's increased well being that results form lower prices paid for imports or higher prices received for exports.

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[24] The Penn World Tables display a set of national accounts economic time series covering a large number of countries. Its unique feature is that its expenditure entries are denominated in a common set of prices in a common currency so that real international quantity comparisons can be made both countries and over time. For more information, please refer to Summers and Heston (1991).

8. *Seigniorage share in year t* = the ratio of the difference in the stock of reserve money between year *t* and year *t*-1 to that of nominal GDP in year *t*.

9. *Measure of cost of debt servicing* = annual change of the difference between the real interest rate and the real GDP growth rate, multiplied by lagged debt-GDP ratio, where the real interest rate is defined as

$$\text{Real Interest Rate} = \left[(1 + \text{Deposit Interest Rate in year t}) * \frac{\text{GDP Deflator in year t -1}}{\text{GDP Deflator in year t}} \right] - 1$$

Negative Bequest Motive Regressors

1. *Expected per capita real GDP growth rate of the economy*

Recall that Cukierman and Meltzer postulated that as the expected real GDP growth rate increases, people would tend to expect future generations to have a higher standard of living relative to the current generation. Thus, this tends to increase the share of bequest-constrained individuals in the population. In this light, expected per capita real GDP growth rate, rather than the expected growth rate in aggregate GDP, is more intuitively appealing as a proxy for the expected welfare of future generations. This was constructed as the slope coefficient of a "rolling regression" of the preceding 25 years' log of the real per capita GDP on a time trend. More specifically, the expected per capita real GDP growth rate of the economy in year *t* would be the slope coefficient obtained when the log of real per capita GDP for the years *t*-1 through *t*-25 is linearly regressed on a time trend[25].

2. *The distribution of income or total wealth*

A suitable proxy for the spread of the income distribution is the Gini coefficient. Data for Gini coefficients are from Deininger and Squire (1996) and only observations that are in the "accepted" category are used. Observations in this category are considered by Deininger and Squire to be relatively more consistent, more accurately measured, and reliable. However, this data set includes Gini coefficients of different measures. Two different measures are income and expenditure based Gini coefficients. Since individuals are better able to smooth expenditure as opposed to income, Gini coefficients based on expenditure measures are, ceteris paribus, smaller than those based on income. Deininger and Squire note that the mean difference between the two is about 6.6 out of 100, and recommend adding the difference of 6.6 between expenditure-based

[25] The choice of using the past 25 years is somewhat arbitrary. Alternatives, such as using data on the log of per capita GDP of the past 15, 20 and 30 years, will be presented in the sensitivity analyses in the appendix.

and income based coefficients to the expenditure based Gini coefficients in the sample[26] to avoid the exclusion of a substantial number of countries. I follow their suggestion.

Another problem with the data set was that the available observations were irregularly spaced and relatively scarce. Note that the true gross income distributions tend to change very slowly and that there will be unavoidable inconsistencies in the measurement of the Gini coefficient, (both across countries and across time). In order to minimize the effect of extreme observations and to increase the number of annual observations, the available data were smoothed using locally weighted scatterplot smoothing (lowess) and then linear interpolation was performed using the new smoothed observations[27]. The "adjusted and smoothed" Gini coefficients were then used in the regressions[28].

3. *Expected longevity*

The bequest motives model postulates that the longer the period of time an individual spends in retirement, the more likely he or she is likely to be bequest-constrained. The Proposition thus indicates that an increase in expected longevity will lead to a larger budget deficit, under majority rule.

In view of the above, a very appropriate variable for use as a proxy for the expected time an individual expects to spend in retirement is life expectancy at age 65[29]. However, across the 87 countries included in the sample, there is a less than satisfactory number of observations for life expectancy at age 65. The problem of insufficient data is especially severe for the less developed countries, with some of them having as few as 3 observations out of the possible 45 years of data. On the other hand, data for life expectancy at birth is relatively more abundant with annual observations being available even for the less developed countries. Given the high

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[26] Such an adjustment, they argue, would be supported by the fact that the difference between income and expenditure based Gini coefficient does not does not to seem to follow any distinguishing pattern, except that it narrows over time. Thus it is not significantly correlated at the 5% levels with levels of income, continent dummies or the average levels of the Gini in the country but correlated negatively (with a correlated of 0.47) with time.

[27] The smoothed values are obtained by running a regression of the original Gini coefficient data on time. Each smoothed value of the Gini coefficient is generated using the original Gini coefficient for that particular year and a small amount information of the actual Gini coefficients observed in the past and future years. In this method, the regression is weighted so that the central point, the Gini coefficient in year t ($gini_t$, $year_t$) gets the highest weight and points farther away (based on the distance $|gini_s - gini_t|$ receive less. The estimated regression is then used to predict the smoothed value $\hat{gini}_t$ based on $gini_t$ only. The procedure is repeated to obtain the remaining smoothed values, which means a separated weighted regression is estimated for every point in the data. A bandwidth of 0.5 was used, which implies that centered subsets of 50 per cent of the observations are used for calculating smoothed values for each point. The greater the bandwidth, the greater the smoothing.

[28] The results of panel regressions in which the Gini coefficients are neither adjusted nor smoothed are presented in the appendix for comparison.

[29] The expected additional number of years a person is expected to live, given that he or she has survived until age 65.

correlation between life expectancy at age 65 and life expectancy at birth[30], a simple way to get around problem of having insufficient number of observations for "life expectancy at age 65" would have been to use "life expectancy at birth" as a proxy. However, in order to get a more accurate representation of the expected time an individual spends in retirement, a less crude technique was used. This technique involves the use of the available data on life expectancy at birth and at age 65 to make out of sample predictions for years in which data on life expectancy at birth is available but life expectancy at age 65 is not. For details, please refer to the construction of Method 2 of estimating life expectancy at age 65 in the appendix.

Tax-Smoothing Variables

Recall that the tax smoothing approach postulates that unanticipated increases in government expenditure will tend increase the budget deficit (and vice versa), while unanticipated increases in output will tend decrease the budget deficit (and vice versa). To obtain a proxy for unanticipated changes in per capita real government expenditures, I shall use the percentage deviation of the current level from the expected level of per capita government expenditure or:

$$\frac{G_t - \overline{G}_t}{\overline{G}_t}$$

where

G_t is the level of real per capita government expenditure in year t

$\overline{G}_t$ is the expected level of per capita real government expenditure in year t constructed by projecting the level of per capita real government expenditure in year t-1 by using an estimated annual growth rate of per capita real government expenditure. The estimated annual growth rate is the simple average of the previous three annual growth rates of per capita real government expenditure.

Similarly, to account for unanticipated changes in per capita output of the economy, I shall use the percentage deviation of the current level of real per capita GDP from the expected level of real per capita GDP or:

$$\frac{Y_t - \overline{Y}_t}{\overline{Y}_t}$$

[30] Based on the available 925 observations of the two life expectancies that coincide in terms of the country and year in our data set, we obtained a correlation coefficient of 0.8015.

where

Y_t is the level of real per capita GDP in year t

$\overline{Y}_t$ is the expected level of real per capita GDP in year t constructed by projecting the level of per capita real GDP in year t-1 by using an estimated annual growth rate of per capita output. The estimated annual growth rate is the OLS slope coefficient is the simple average of the previous three annual growth rates of the log of per capita real GDP.

Some will undoubtedly find the choice of previous 4 years[31] for estimating the annual growth rate of per capita real government expenditure and output to be extremely arbitrary. The sensitivity analyses section in the appendix presents regression results where alternative numbers of years, as well as a different method, are used to estimate annual growth rates for both tax-smoothing variables[32].

6.3 Fixed-Effects Panel Regressions

Panel regressions were estimated for the period 1975 to 1992 and both country and time fixed effects were used. Annual observations were used and countries did not have the same number of observations[33]. A lagged dependent variable was include as a regressor to reduce the serial correlation of the error terms.

Missing Data Technique

A major problem with estimating cross-country regressions that use socio-economic variables is a large number of missing observations. In this case, data on the Gini coefficient and life expectancy at age 65 are often sparse and available at irregular intervals. The problem is exacerbated by the fact that it is usually the less developed countries with the missing data for these variables, and it is the less developed countries that are likely to exhibit bequest constrained behavior. Thus, the exclusion of countries due to the lack of socio-economic (or any) data is likely to introduce a systematic bias against the existence of negative bequest motives.

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[31] Note that using the simple average of the previous 3 annual growth rates is equivalent to using 4 years of data.

[32] Roubini and Sachs (1989a) model unanticipated changes in output for a country as the deviation of actual output from its average value over the previous three years in that country. However, note that since output usually has an upward trend, this method will tend have an upward bias in unanticipated increases in output, since the measure of average value of output will consistently under-predict the true "expected value".

[33] In the jargon of panel data analysis, the panel is "unbalanced".

In an attempt to harvest all possible information from the data set, a method developed by Griliches (1986) for the treatment of missing data or observations shall be used. Recall that I have been able to work around the problem of having insufficient observations for elderly life expectancy by obtaining predicted values of elderly life expectancy by using data on life expectancy at birth, which is highly correlated with elderly life expectancy. Since a variable that is highly correlated with the Gini coefficient is not available, this missing data technique has been applied to the Gini coefficient.

The technique involves three stages. In the first stage, the "normal" estimation of the fixed effects panel regression with the dependent variable budget surplus share being regressed on all independent variables, including the Gini coefficient, is estimated:

Stage 1 Regression

$$Y_{it} = \beta_0 + \alpha_{Ci} + \alpha_{Yt} + \beta_1 Y_{i,t-1} + \sum_{n=2}^{N} \beta_n X_{nit} + \varepsilon_{it} \qquad \forall i,t$$

where

i is the country index
t is the year or time index
α_{Ci} is the country specific effect for country I
α_{Yt} is the time specific effect for year t
$Y_{i,t-1}$ is the budget surplus share lagged by one year
X_n is the n^{th} explanatory variable. The list of explanatory variables is given in Table 6.1.

In the second stage, the Gini coefficient is regressed on all of the other independent variables used in the Stage 1 panel regression and obtain the predicted values of the Gini coefficient from this regression:

Stage 2 Regression[34]

$$(Gini)_{it} = \gamma_0 + \mu_{Ci} + \mu_{Yt} + \gamma_1 Y_{i,t-1} + \sum_{n=2}^{N-1} \gamma_n X_{nit} + \varepsilon_{it} \qquad \forall i,t$$

where

μ_{Ci} is the country specific effect for country I
μ_{Yt} is the time specific effect for year t

[34] Note that the number of explanatory variables only goes up to N-1 because the Gini coefficient is excluded.

Using the predicted values of the Gini coefficient from the Stage 2 regression, a new variable, say "*new Gini*", is generated. This *new Gini* will take the original value of the Gini if it is present, and will take on the predicted value if the actual Gini value is missing[35]. This *new Gini* together with the estimated coefficient of the Gini variable from the Stage 1 regression is used to construct a new measure of the dependent variable:

$$(\text{New Surplus Share})_{it} = (\text{Surplus Share})_{it} - \beta_{Gini}(\text{new Gini})_{it}$$

Stage 3 of the missing data technique involves the estimation of the regression with the new measure of the surplus share as the dependent variable, being regressed on all of the independent variables, with the exception of the Gini coefficient:

Stage 3 Regression

$$(newY)_{it} = \beta_0 + \alpha_{Ci} + \alpha_{Yt} + \beta_1 Y_{i,t-1} + \sum_{n=2}^{N-1} \beta_n X_{nit} + \varepsilon_{it} \qquad \forall i,t$$

The estimated coefficients will be thus obtained from the Stage 3 Regression, with the exception of the Gini variable, which will be obtained from the Stage 1 Regression. While this missing data technique does not increase the efficiency of the estimated coefficient of the Gini variable, it does allow the rest of the coefficients to be estimated more efficiently by increasing the number of observations being used in the estimation[36].

Table 6.1 presents the results of the panel regressions that employ the missing data technique, along with the results of the normal panel regressions for comparison. Note that the normal panel regressions are simply the Stage 1 regressions of the missing data technique. Standard errors have been corrected using White's correction for heteroscedasticity. No formal test for serial correlation has been conducted. Recall that it was shown in Section 2 that developed and developing countries exhibited substantial differences in their budget surplus shares trends. Thus, apart from Reg 1 and Reg 2, where all countries were included in the estimation sample, the results of the separate regressions for developed (Reg 1a and 2a) and developing countries (Reg 1b and 2b) are also presented. We see that in all three categories of countries, the missing data approach substantially increases the number of observations used in

[35] Note that the Stage 1 regression will generate a predicted value of the Gini coefficient for a certain country and year so long as none of the other independent variables is missing for that country and year.

[36] In order for the coefficients of the non-missing independent variables to be estimated more efficiently, the probability of the Gini coefficient being missing must not be correlated with the level of the budget surplus share. I performed a simple rank test where the mean of the budget surplus shares for each of the 87 countries over the years 1975 to 1992 is ranked. By casual inspection, we see no correlation between the countries with no Gini data and the level of the budget surplus share.

the estimation, this will lead to an efficiency increase of the estimated coefficients of the non-missing independent variables.

Tables 6.2a and 6.2b present the observations actually included in the missing data technique regressions for developed and developing countries, respectively. Table 6.3 gives the summary statistics of the variables used in the panel regressions.

Tax-Smoothing Variables

Recall that the tax smoothing approach postulates that unanticipated increases in government expenditure will tend decrease the budget surplus (and vice versa), while unanticipated increases in output will tend increase the budget surplus (and vice versa). Thus, a negative coefficient will be expected for unanticipated changes in per capita real government expenditures and a positive coefficient for unanticipated changes in per capita output.

Table 6.1 shows that both tax-smoothing variables (variables 11 and 12) are of the theoretically expected signs and are statistically significant for all countries (Reg 1) and developing countries (Reg 1b). For the developed countries (Reg 1a), only the coefficient for unanticipated changes in real per capita government expenditure is statistically significant. The statistical insignificance of the unanticipated changes in real per capita GDP variable for the developed countries is again exhibited by the results of the normal panel regressions. Thus, the tax-smoothing behavior appears to be a significant factor in determining the levels of government budget deficits for developing but not for developed countries.

Sensitivity analyses, presented in the appendix, reiterates this point as they reveal that the coefficient for unanticipated changes in real per capita GDP of developed countries is always statistically insignificant. On the other hand, these sensitivity analyses show that for developing countries the coefficients for both unanticipated changes in per capita real government expenditure and output are always highly significant. Thus, it can be concluded that the tax-smoothing behavior is important in developing countries but not in developed countries and this finding is robust to various regression specifications.

The results for the industrialized countries are in accord with Roubini and Sachs (1989b). Recall from Section 3 that Roubini and Sachs found that tax-smoothing behavior was not generally evident in the developed countries. Tax-smoothing behavior for budget deficits was only found to be apparent in the United States, United Kingdom and Finland. On the other hand, my results for developing countries differ from that of Roubini's (1991) finding that tax-smoothing was not well supported by data from developing countries. As mentioned in Section 3, he found little evidence of an effect of shocks to output growth on the fiscal deficit. However, it was argued that Roubini's use of the real GNP growth rate as a measure of cyclical fluctuations was inappropriate because it is possible for high output growth to be experienced even when the economy is well below potential GDP, like during the recovery phase of the business cycle. In addition, the results from the panel regressions here should provide relatively more accurate estimated coefficients than those from single country OLS regressions used by Roubini (1991).

Negative Bequest Motive Variables

Recall that the Cukierman-Meltzer negative-bequest motive theory of budget deficits postulates that budgetary deficits will be larger under majority rule, the larger the expected long-run growth rate of the economy, the larger the spread of the income distribution and the higher the longevity. Negative signs are therefore theoretically expected for all coefficients of the bequest motive variables (variables 13, 14 and 15), when the dependent variable is the budget surplus share.

Table 6.1 shows that the regressions results for both developed and developing countries exhibit some support for the theory of negative bequest motives. At the global level, the coefficient of expected per capita growth rate is negative but not significant. When the separate regressions are estimated for developed and developing countries, negative coefficients for this variable are also returned, but only that for the former is statistically significant.

With regard to the spread of the income distribution, which is proxied by the Gini coefficient, only the regression for the developing countries return a coefficient with the theoretically postulated negative sign. This coefficient, however, is not statistically significant. Regressions for all countries and developed countries have positive estimated coefficients for the Gini coefficient, both of which are statistically insignificant.

Up until now, we have seen little qualitative difference between the estimated coefficients of the tax-smoothing and bequest motive variables of the regressions that did and did not employ the missing data technique. The "contribution" of the missing data technique is seen when we examine the estimated coefficients for the life expectancy variable. Although the coefficients for the life expectancy term are negative but insignificant for all countries and the developed countries, the coefficient for developing countries is negative and statistically significant.

Another interesting observation is that the coefficient for political rights for the developed countries is positive and highly statistically significant. Since a small value in the index implies a high level of political rights, the coefficient implies that an improvement in political rights to tends to increase the budget deficit share. This suggests that the preferences of the general public are important in the determination of the size of budget deficit, and thus lends strong support to the theory of negative bequest motives.

Sensitivity analyses show the above results are generally robust to various specifications. As will be shown in the appendix, variation in the measures of the Gini coefficients used in the panel regressions have little effect on the on the statistical significance of the bequest motives and tax-smoothing variables. Apart from the "adjusted and smoothed" Gini coefficients described earlier, the panel regressions were also estimated with the Gini coefficients were no adjustment was made for the difference between income and expenditure based Gini coefficients, and also with Gini coefficients that were adjusted but not smoothed.

Four proxies for expected longevity were used in the sensitivity analyses. They were life expectancy at birth, life expectancy at age 65 and 2 different sets of estimated life expectancy at age 65. While both sets of estimated life expectancy at age 65 were obtained by regressing life expectancy at age 65 against life expectancy at birth, different specifications were used. The use of life expectancy at birth and the 2 estimated life expectancies at age 65 gave qualitatively and quantitatively similar regression results. However, the use of the actual life expectancy at age 65 as a proxy for expected longevity actually gives very strong support for the theory of negative bequest motives for the developed countries. Unfortunately, there were less than a satisfactory number of observations when the same was attempted for the developing countries. In order to maintain the uniformity of the variables used for developed and developing countries, estimated life expectancy at age 65 generated by Method 2 was used.

Lastly, specifications in which the time period used in the construction of the expected growth rate variable (Variable 13) is changed was estimated. Time periods of alternative intervals of 15, 20 and 30 years were used. Here the sensitivity analysis shows that the above results are somewhat sensitive to such variations in the time periods. The significant negative coefficient for the expected growth rate variable for the developed countries, and the significant negative coefficient for the life expectancy variable for the developing countries are specials cases that occur only when the previous 25 years is used in the construction of the expected growth rate variable. However, this time interval was chosen for constructing the expected growth rate variable since its specification returns the highest R-squared and adjusted R-squared values, as compared to the other specifications that employ alternative time period lengths for constructing the expected growth rate variable.

6.4 Reconciling the Empirical Results with the Theory of Negative Bequest Motives

At the first glance, it would seem that the theory of negative bequest motives is not well supported by the data. However, it is possible to provide an explanation for the statistically insignificant coefficients of the expected growth rate variable (for the developing countries) that is fully consistent with the negative bequest motive of budget deficits. Recall that Cukierman and Meltzer argue that high long run real per capita GDP growth rates tend to indicate that future generations are likely to be better off than the current generation and thus leading to larger number of bequest-constrained individuals within the economy. This "intergenerational effect" of high long-term growth rates tends to decrease the budget surplus share.

However, it can be argued that there exists a second side-effect of high long-run growth rates (which has occurred), which is to significantly raise the current standard of living, thereby decreasing the number of bequest constrained individuals in the economy. This "wealth effect" will tend to increase the budget surplus share of the economy. The resultant effect of high long-term economic growth rates on the proportion of bequest-constrained individuals would be therefore indeterminate.

For the developed countries, the expected growth rates coefficients are negative and significant, which may be indicative that the intergenerational effect of high growth rates is significantly larger than the wealth effect. On the other hand, developing countries display an insignificant expected growth rate coefficient, which may hint that the magnitudes of the intergenerational and wealth effects may be on approximately par with each other. Thus, an overall negligible effect on the budget surplus share results.

A similar approach can be also used to explain the statistical insignificance of the elderly life expectancy coefficient for the developed countries. Since life expectancy is another indicator of standard of living, the effects of an increase in elderly life expectancy can be again decomposed into two components. Firstly, as argued by Cukierman and Meltzer, there exists a "retirement" effect whereby individuals are concerned about the adequacy of resources for consumption during retirement. This effect tends to increase the population share of bequest-constrained individuals and is thereby expected to lead to a decrease in the budget surplus share. However, an increase in elderly life expectancy, implies that individuals have had access to good health care and nutrition that are natural by-products of long-term economic growth and also a higher standard of living. As such, increases in elderly life expectancy can also result in a "wealth" effect, which leads to a smaller population share of bequest constrained individuals, and hence a positive effect on the budget surplus. These two clashing effects can result in a statistically insignificant coefficient for elderly life expectancy even if the theory of negative bequest motives were to hold. The insignificant negative coefficient of the life expectancy variable for the developed countries can thus imply that the retirement effect of about the same magnitude as the wealth effect of living longer, resulting in an negligible effect on the budget deficit.

For the Gini coefficient, one possible reason for its lack of statistical insignificance is that the theory of negative bequest motives is derived in a closed economy framework. For small open economies, interest rates will not increase with the issue of public debt due to an inflow of foreign capital. As such, individuals at the high end of the income distribution, who typically derive much of their income from capital, will not have an incentive to vote for more debt issue. This implies that for small open economies with large degrees of income inequality may not experience larger budget deficits.

A simple test of this hypothesis is attempted: the more open an economy is, the smaller the magnitude of the (negative) partial effect of the Gini coefficient on the budget surplus share. Using trade share in GDP as a measure of openness, a new variable is constructed by multiplying our "adjusted and smoothed" Gini coefficient with the trade share. The coefficient of this new interactive term can then be interpreted as the partial effect of trade share on the partial effect of the Gini coefficient on the budget surplus share. Assuming the hypothesis is correct, an increase in the trade share is expected to have positive effect on the partial effect (making it less negative) of the Gini coefficient on the budget surplus share. The coefficient of this interactive term between the Gini coefficient and the trade share is thus expected to be positive.

Table 6.4 presents the regression results with the inclusion of the additional interactive term. Note that I am unable to use the missing data technique with the inclusion of the interactive term between the Gini and trade share, and thus have reverted back to using the "normal" panel regressions for this exercise. Referring to regressions Reg 3a and 3b, we see that the coefficients of the interactive term between the trade share and the Gini coefficient (variable 15) are indeed positive. However, the coefficients are not statistically significant for both the developed and developing countries.

One possible reason for the insignificance of the coefficient of the interactive term could be the high correlation between trade share and the interactive term. Correlation matrices show that correlation to be 0.97 for developed countries and 0.99 for developing countries. Hence, the trade share variable is dropped and the regressions are re-estimated for both developed and developing countries (Reg 4a and 4b). The results show that the coefficient of the interactive term remains positive and turns significant for the developed countries but not for the developing countries. At the same time, the coefficient of the Gini variable for the developed countries turns negative but remains insignificant.

The regression results show evidence to support my hypothesis that the openness of the economy has a dampening effect on the negative influence of the Gini coefficient on the budget surplus share, at least in the case of the developed countries. A potential problem with the above test could be that the trade share may not be the most appropriate measure of openness for the testing of this hypothesis. Given that I am concerned with the amount of capital inflow in the event of an upward pressure in the interest rate, a more suitable measure of openness would be the amount of capital inflow and outflow as a share of GDP. Using this alternative measure of openness could very well result in stronger support for our Gini dampening hypothesis. I will pursue this alternative test at a later date.

6.5 Post Regression Analysis

To move beyond the statistical significance of coefficients, one wants to know which variables can explain a large share of the observed differences in budget deficits. This section weighs the explanatory variables in terms of their contribution in accounting for actual changes in the budget surplus shares. That is, with "Surplus" as the share of central government surplus in GDP and the X_i's as the vector of explanatory variables, I can explain differences in surpluses between two setting with this decomposition:

$$\Delta \text{ Surplus Share} \quad = \quad \sum_i \beta_i \Delta X_i \quad + \quad \Delta \text{ prediction error}$$

Each $\beta_i \Delta X_i$ term is the difference in surplus predicted, or explained, by the differences in the i^{th} explanatory variable.

6.5.1 Accounting for Differences Over Time

The accounting of intertemporal differences in budget deficits will be conducted separately for developed (Table 6.5a) and developing countries (Table 6.5b). For the two country categories, the intertemporal accounting will be further broken into two parts, one for each of the two time periods, namely 1975 to 1983 and 1983 to 1992. Recall from Section 2[37] that during these periods, developed and developing countries underwent distinctly different trends in their budgets.

[37] Insufficient data prevented the inclusion of any analysis before 1975.

Developed Countries

Table 6.5a shows changes in the budget surplus that are due to actual changes in the explanatory variables used in the panel regressions for the developed countries. Column (2) of the table presents the actual changes in the average values of the explanatory variables from 1975 to 1983. For example, the change in the log of real GDP per capita is calculated as the difference between the industrialized country average the log of real GDP per capita in 1983 and that in 1975. Column (3) reproduces the estimated coefficients obtained from Reg 1a in Table 6.1. The fourth column shows the estimated change of the budget surplus due to the change in the explanatory variable in that row. It is derived as the product of the values in columns (2) and (3). The derivation of the actual change in the budget surplus share is identical to that of the actual changes in the explanatory variables.

The total estimated change in the budget surplus share is simply the sum of the estimated changes in column (4). The total effects for the tax-smoothing and bequest motives variables are the sum of the values in the respective rows in column (4). The contribution of the tax-smoothing or bequest motives variables is the ratio of the respective total effects to the actual change of the global average budget surplus share. Values pertaining to the period 1983 to 1992 are similarly presented and calculated. The estimated coefficients from Reg 1a are again used for the 1983-1992 time period and are presented again in column (6).

First note that for both time periods, the regression specifications were able to correctly predict that average developed country budget surplus share would decrease in the 1975-83 period and would increase in the 1983-92 period. For the period 1975 to 1983, when the actual average industrialized country budget surplus share fell by 1.4 percentage points, the regression specification predicted an estimate of a larger decrease of 3.7 percentage points. For the period 1983 to 1992, the regression specification made an over-prediction an increase of 3.8 percentage points, relative to the actual increase of 2.0 percentage points. Thus, all explanatory variables together account for 255 percent of the 1975-1983 dive into deficits, and 193 percent of the 1983-92 deficit reduction. The control variables, those that are neither tax-smoothing nor bequest motives variables, explain 210 percent of the 1975-83 dive into deficits and 216 percent of the 1983-1992 recovery from deficits.

For the 1975-83 period, of the two theories of budget deficits, only the bequest motive variables correctly predicted that the budget surplus share would fall; together they account for 47.3 percent of the decline in budget surplus share. For the period 1983 to 1992, the tax smoothing variables, but not the bequest motive variables, correctly predicted that the average developed country budget surplus would rise, accounting for about 7 percent of the increase.

Casual inspection of the values in column (4) reveals that political rights and urban population share were two contributing factors for the dive into large budget deficits in the 1973-83 period. An improvement in political rights can account for about 74 percent of the increase in deficit share, while an increase in the urban population share can account for 165 percent. The large role of political rights suggests that the preferences of the general public are important in the determination of the level of budget deficits, and thus lending support to the negative bequest motives theory.

Another dominant factor of the budget surplus share is the level of per capita GDP. From the table, we see that increases in per capita GDP tends to decrease the budget deficit share significantly. This was the case in both the 1975-83 and the 1983-92 time period. However, in the former time period, the positive effect of the increase in per capita real GDP was not sufficiently large to offset the negative effects of the increase in political rights and increase in urban population share, which resulted in a large decrease in the budget surplus share for the developed countries. In contrast, the developed countries on average in the 1983-92 period did not experience a large improvement in political rights, but they did see a large increase in per capita GDP that led to the large increase in budget surplus shares.

Developing Countries

I now turn to determining the economic significance of the independent variables in explaining time series differences of budget surplus shares of developing countries (Table 6.5b). The construction of Table 6.5b is identical to that of Table 6.5a. The estimated coefficients for both time periods are obtained from Reg 1b in Table 6.1. Relative to that of the developed countries, the panel regression was able to provide slightly less accurate estimates of the change in budget surplus share. For the period 1975 to 1983, the actual average developing country budget surplus share fell by 2.4 percentage points, the regression specification predicted an estimate of a decrease of 1.5 percentage points. However, for the period 1983 to 1992, the regression specification predicted an average surplus share decrease of 2.7 percentage points, when there was an actual increase of 2.5 percentage points. The regression can thus account for 64 percent of the 1975-1983 dive into deficits and -106 percent of the 1983-1992 deficit reduction.

The control variables can account for 142 percent of the 1975-83 increase in deficits and only 11 percent of the 1983-1992 recovery from the deficits trough. Neither the tax smoothing or bequest motive variables were able to correctly predict the budget surplus share decrease from 1975 to 1983 and the deficit reduction from 1983 to 1992.

6.5.2 Accounting for Differences Between Developed and Developing Countries

This section explores how well the bequest motives and tax-smoothing variables account for differences in budget surplus shares between developed and developing countries at two arbitrarily selected points in time, 1975 and 1992.

Table 6.6 shows the differences in the budget surplus shares that are due to actual differences in the explanatory variables used in the fixed-effects panel regressions. Its construction is identical to those of Table 6.5a and 6.5b, with actual differences between the simple average values of the explanatory variables between the developed and developing countries being presented in columns (2) and (5) instead of intertemporal changes[38]. Columns (3) and (6) reproduces the estimated coefficients from regression results Reg 1. The fourth and seventh columns give the predicted effect on the budget surplus share due to the difference in the explanatory variable in that row and are derived from the product of the entries in the two previous columns. The actual difference in the budget surplus share is the difference between the simple averages of the budget shares of developed and developing countries in 1975 and 1992. Values for the estimated total difference in budget surplus shares, total effects and contributions of the tax-smoothing and bequest motive variables are calculated as in Tables 6.5a and 6.5b.

We see that in 1975 and 1992 developed countries had budget surplus shares that were on average smaller than the developing countries by 1.8 and 1.4 percentage points, respectively. From Figure 2.3, we know that both groups were actually running budget deficits in both years, implying that the differences in the average surplus shares should be interpreted as the developed countries having larger deficit shares than that of developing countries by 1.8 and 1.4 percentage points. The regression specification, however, incorrectly predicted that the deficit shares of the developed countries to be smaller than that of the developing countries by 2.2 and 4.6 percentage points in 1975 and 1992, respectively.

The tax-smoothing variables together also did not give correct predictions to the sign of the difference in deficit shares between the two groups of countries. They predicted that the developed countries would have an average deficit share that was smaller than the developing countries by 0.03 percentage points in both 1975 and 0.03 percentage points in 1992. In contrast, the bequest motive variables were able to correctly predict that the average deficit share of the developed countries would be larger than that of the developing countries for both 1975 and 1992. The bequest motive variables together accounted for 122 percent of the difference in 1975,

[38] Columns (2) and (5) is constructed as the average value of each explanatory variable of the developed countries minus the corresponding value of the developing countries.

and nearly 186 percent of the difference in 1992. Although all three bequest motive variables contributed to the correct predictions, the contribution of the life expectancy variable was particularly large. This life expectancy variable could account for 74 percent and 129 percent of the difference in average surplus share between developed and developing countries in 1975 and 1992, respectively.

Looking at the control variables, we see that extremely large differences in the log of pre capita real GDP between the developed and developing countries were the main culprits for the wrong predictions of the regression specification. The difference in the log of per capita real GDP alone was responsible for the regression to predict that the average deficit share of the developed countries would be smaller than that of developing countries by a whopping 9 percentage point in 1975 and 11 percentage points in 1992. Differences in urban population shares between the two groups of countries had also predicted that the deficit shares of the developed countries would be much larger than that of the developing countries. However, the large but opposite effect of the log of per capita real GDP variable more than offset the effect of urban population share variable, resulting in the wrong predictions of the regression in both years.

6.5.3 Accounting for Differences Between Individual Countries

In this third post regression analysis section I attempt to determine how well the bequest motives and tax-smoothing variables can account for differences in cross-country budget surplus shares. First, a number of countries are selected. Then using actual differences in the values of the explanatory variables between the selected countries and a pre-assigned benchmark country in a certain year, the contributions of the explanatory variables in accounting for the cross-country differences in budget surplus shares were derived. The selected developed countries were compared against the United States, while the selected developing countries compared to South Korea. Comparisons were performed for the arbitrarily selected years 1980 and 1985. The results of which are presented in Table 6.7a for the developed countries and Table 6.7b for the developing countries.

Developed Countries

Each of the rows in Table 6.7a shows the product of the actual difference of the explanatory variable in that row between the developed country in that column and the United States in 1980 or 1985, with the relevant regression coefficient. The regression coefficients are obtained from Reg 1a. Values for the estimated total difference in budget surplus shares, total effects and contributions of the tax smoothing and bequest motive variables are calculated as in Table 6.6.

The countries were selected such that in both years, two countries would have budget surplus shares that are smaller than that of the United States, while the other two countries would have surplus shares that are larger. Apart from that criterion, the countries were arbitrarily selected. We see that the regression specification tends to produce estimates that are generally in the same direction than the actual differences of the budget surplus share between the selected countries and the United States. Out of the eight comparisons, only three predictions were in the wrong direction. However, it is also noted that the regression tends to over-predict the differences in cross-country budget surplus shares.

Compared to entire regression specification, both negative bequest motive and tax-smoothing variables do not perform as well in predictin g the differences in budget surplus shares for developed countries. Out of the 8 countries, the tax-smoothing variables together correctly predict the sign of the difference of only 4 of them, and all of them account for less than 3 percent of the actual difference in surplus shares. The bequest motive variables perform just as well by correctly predicting the signs of 4 out of the 8 comparisons with the United States. The contributions of the bequest motive variables to the correct predictions however are more substantial and range from 23 to 332 percent, with 3 of the contributions being below 42 percent.

Developing Countries

I now turn to the cross-country comparisons for the developing countries, the results of which are presented in Table 6.7b. The benchmark country is South Korea and other developing countries were selected such that there would be countries with surplus shares greater than and less than that of South Korea for both years.

We see that the estimated regression is able to correctly predict the direction of the cross-country differences in only 3 out 7 comparisons. Relative to the regression specification, the negative bequest motives and tax-smoothing variables are a little more accurate in predicting cross-country differences. For the tax-smoothing variables, 4 out of 7 predictions were correct, with 3 of the correct predictions accounting for less than 30 percent of the actual difference in surplus shares. The bequest-motive variables performed again equally well, with 4 out of 7 predictions being correct. The contribution of the bequest motive variables to the correct predictions are generally even less than those of the tax-smoothing variables, with 3 of them being less than 20 percent.

7. Conclusion

Cross-country time series data surprisingly reveal significant variations in the size of central government budget deficits over time. The data also indicate that there exist significant differences as well as similarities in the size of budget deficits across countries. These observations bring one to ask the question that is central to this paper: what determines the size of deficits of national governments?

This paper focuses on the factors explaining the differences in the size of budget deficits, both over time as well as across countries. Two prominent theories of budget deficits are used in this paper, namely the Barro (1979) tax-smoothing approach and the theory of negative bequest motives advocated by Cukierman and Meltzer (1989) to explain the above-mentioned differences in budget deficits.

The Cukierman-Meltzer theory of negative bequest motives focuses the intergenerational redistributive aspect of budget deficits. They argue that there exists bequest constrained individuals who would favor larger budget deficits as a means for transferring resources from future generations. Cukierman and Meltzer postulate that increases in the expected rate of economic growth, the spread of the income distribution or expected longevity increases the population share of bequest-constrained individuals, and consequently, resulting in larger budget deficits under majority rule. In contrast, the Barro tax-smoothing approach argues that the main reason for running budget deficits and surpluses is the minimization of the deadweight loss associated with tax collection. Barro shows that a constant average tax rate will minimize the deadweight loss. As such, in the face of unanticipated increases in government expenditures, the budget deficit is postulated to increase, while unanticipated increases in output are postulated to decrease it.

I first investigate the validity of the bequest motives theory and the tax-smoothing approach by estimating country and time fixed-effects panel regressions with the central government overall budget surplus share as the dependent variable. Variables postulated by either theory are included as independent variables, which allows to account for both time-series and cross-country differences in the budget deficits and simultaneously test to the validity of both theories.

Fixed-effects panel regressions, that employs a missing data technique, provide relatively strong empirical evidence that tax-smoothing is a dominant motive behind the running of budget deficits and surpluses by central governments of developing countries, but not in developed countries. In contrast, empirical support for theory of negative bequest motives is not as strong. First, the panel regressions do reveal that the expected growth rate exerts a negative effect on the budget surplus share, which is in accord with negative bequest motives. However, this effect is statistically significant only for developed countries and not for developing countries. For the Gini coefficient, developed countries exhibit a positive but insignificant coefficient, while the developing countries have an insignificant negative coefficient. Finally, the estimated coefficient of the life expectancy variable is negative but significant for the developing countries but not for the developed countries.

In an attempt to reconcile the above results with the bequest motive theory, it is argued that there are associated wealth effects that Cukierman and Meltzer have overlooked in their model. I postulate that increases in the expected growth rate and expected longevity that may have the "by product" effect of decreasing in the population share of bequest-constrained individuals. This may occur since increases in these variables indicate that the current generation is relatively better off than before both in terms of income and standard of living. An increase in these variables may result in two opposing effects on the population share of bequest–constrained individuals, with the net effect to be determined empirically. Statistically insignificant coefficients for the bequest motive variables can therefore mean that the two opposing effects are approximately equal in magnitude.

A possible reason for the insignificant coefficient of the Gini variable is the closed economy framework of the theory. For small open economies, interest rates will not increase with the issue of public debt due to an inflow of foreign capital. Thus, individuals at the high end of the income distribution, who typically derive much of their income from capital, will not have an incentive to vote for more debt issue. This implies that for small open economies with large degrees of income inequality may not experience larger budget deficits. A simple test of this hypothesis is performed by adding a regressor that is an interactive term between trade share and the Gini coefficient. I find some evidence that supports the hypothesis.

Post regression analyses reveal that the both theories are generally weak in accounting for intertemporal changes in budget deficit shares for both developed and developing countries. The theories performed significantly better in accounting for cross-section differences. Out of 15 cross-country comparisons, each theory was able to make 8 correct predictions with regard the sign of the difference between the budget surplus shares of the two countries at that point in time. In addition, the bequest motive variables were also able to substantially account for the differences in the surplus shares of developed and developing countries.

Policy Implications

Determining the factors that significantly influence the size of the budget deficit has important policy implications in the area of budget deficit and debt reduction. We have seen evidence indicating that bequest motive variables play an important part in explaining cross-country difference in budget deficits. Given that the negative bequest motive theory hinges on the existence of bequest-constrained individuals, and that poverty should be a key factor that determines the population share of bequest constrained individuals, I see the above results as showing strong support for reducing poverty as the dominant strategy for long-term government budget deficit reduction.

In this light, having various social programs that tend to reduce absolute and relative poverty such as unemployment benefits, assistance to low income families and public pension benefits for the elderly are sound starting points for a permanent reduction in the deficit. In addition, policies that enhance long-term economic growth are also extremely important since economic growth is also a key ingredient in the poverty reduction recipe. Governments should therefore not attempt to reduce the budget deficit by cutting down on government expenditures on infrastructure, health and education since it is well documented that such government expenditures tend to increase productivity and economic growth. Also, countries should strife to minimize political instability by having more stable governments and also more equitable income distributions. Policies that are aimed at eradicating corruption at all levels of government, and ensuring officials are properly-trained and remunerated will contribute to establishing a capable and clean government that is likely to be more stable. The resulting political stability will tend increase economic growth, reduce the share of bequest-constrained individuals and leading to smaller budget deficits.

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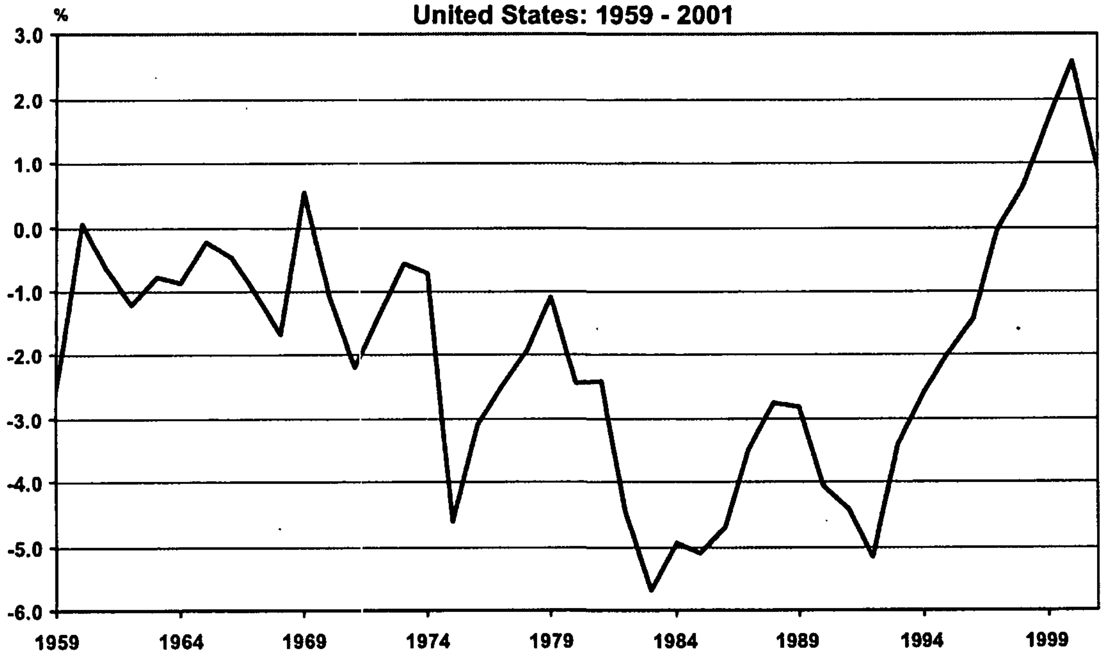
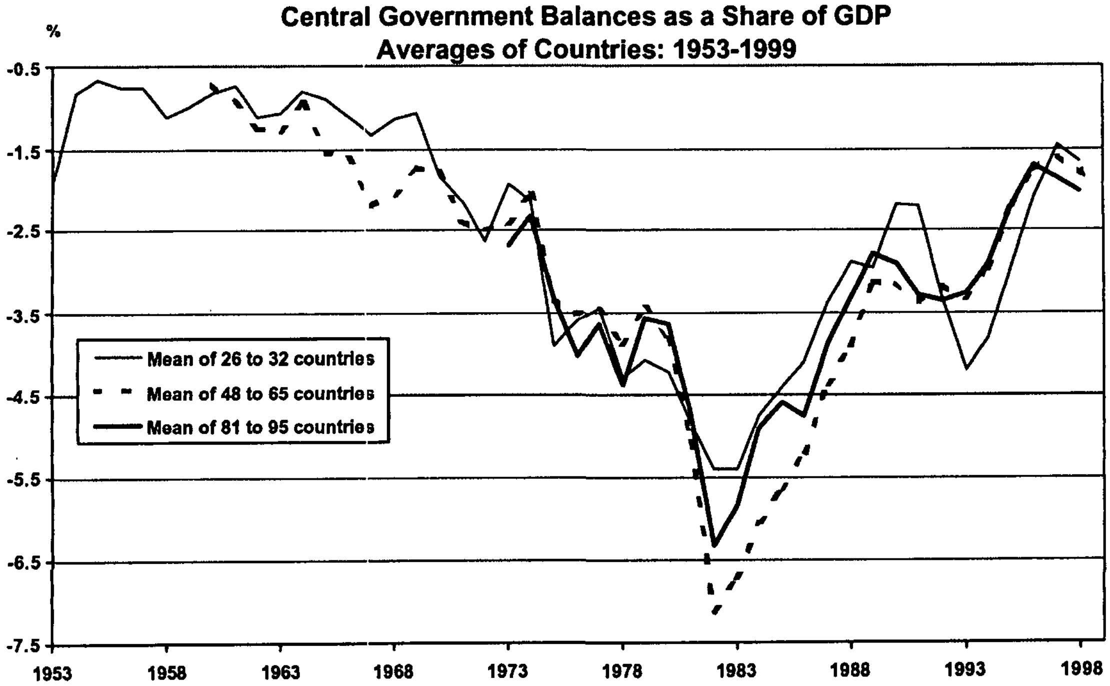
Figure 1.1
Central Government Budget Balance as a Share of GDP
United States: 1959 - 2001



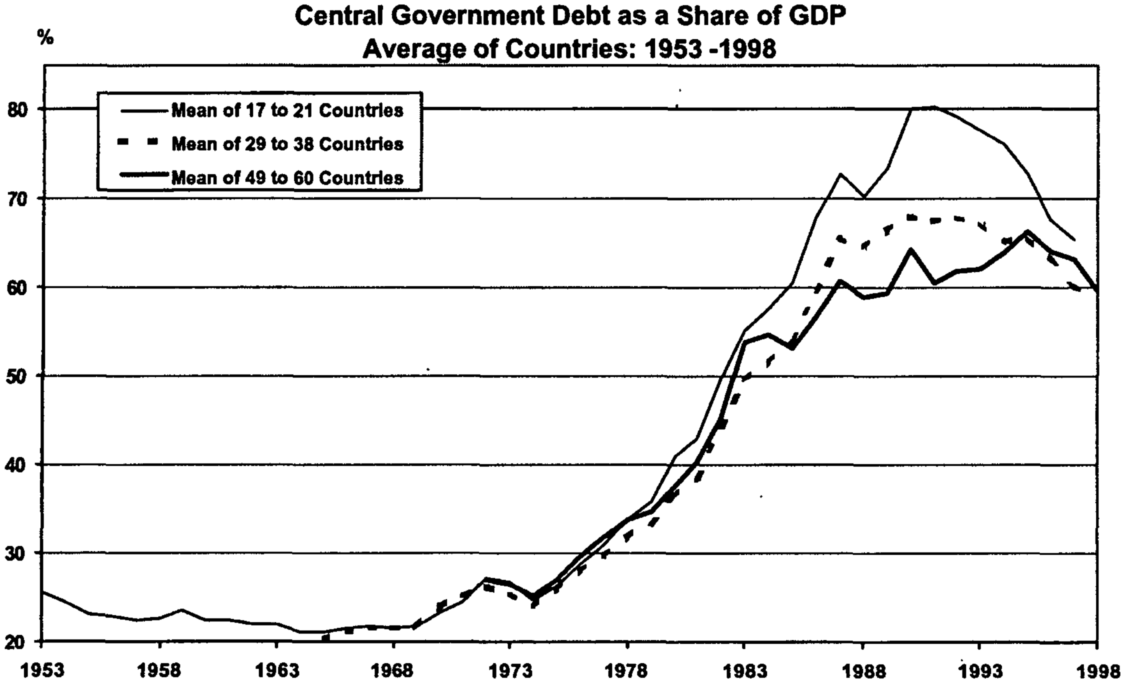
Source: IMF *International Financial Statistics* and the World Bank *World Development Indicators*

Figure 2.1
Central Government Balances as a Share of GDP
Averages of Countries: 1953-1999



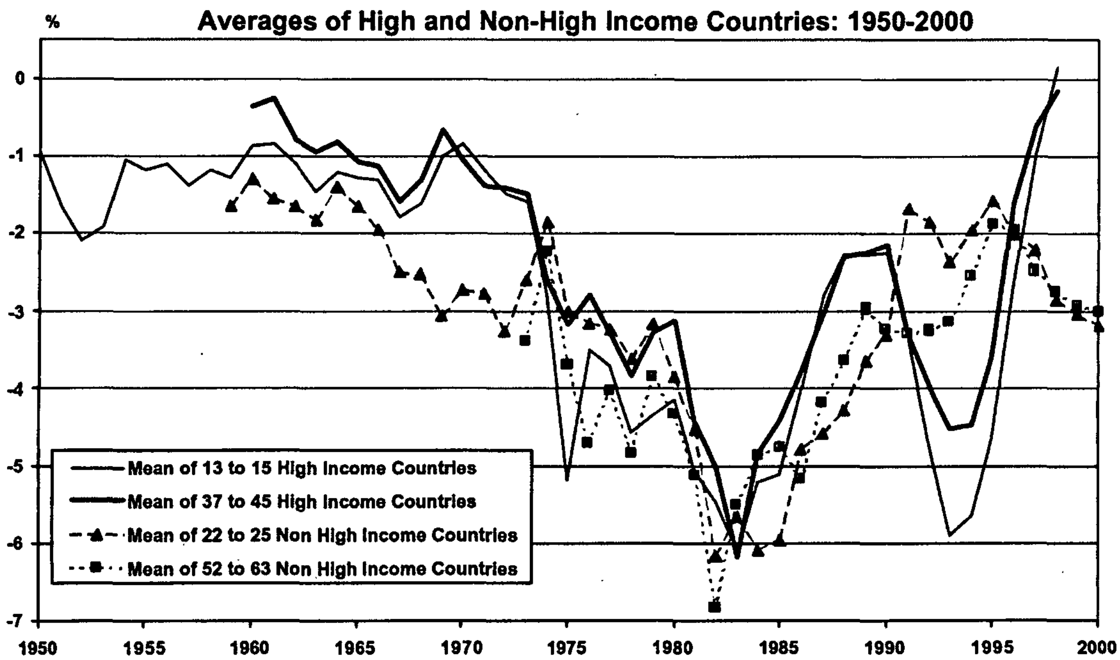
Source: IMF *International Financial Statistics* and the World Bank *World Development Indicators*

Figure 2.2
Central Government Debt as a Share of GDP
Average of Countries: 1953 -1998



Source: IMF *International Financial Statistics* and the World Bank *World Development Indicators*

Figure 2.3
Central Government Balances as a Share of GDP
Averages of High and Non-High Income Countries: 1950-2000



Source: IMF *International Financial Statistics* and the World Bank *World Development Indicators*

Table 6.1
Testing Bequest Motives and Tax-Smoothing Approaches
Fixed (Country & Time) Effects Panel Regressions
Dependent Variable: Central Government Budget Surplus Share

	Missing Data Technique			Normal		
	All	Developed	Developing	All	Developed	Developing
Years : 1975 -1992	Reg 1	Reg 1a	Reg 1b	Reg 2	Reg 2a	Reg 2b
Control Variables						
1. Dependent Variable Lag 1	0.6922***	0.4137***	0.7118***	0.8387***	0.6932***	0.8202***
	(0.071)	(0.134)	(0.083)	(0.073)	(0.078)	(0.12)
2. Index of Political Rights	0.0011	0.0216**	3.61E-05	0.006**	0.0144**	0.0036
	(0.002)	(0.009)	(0.002)	(0.003)	(0.007)	(0.003)
3. Agricultural Share (-)	-0.1115*	-0.1161	-0.091	-0.0287	-0.208	-0.0686
	(0.064)	(0.278)	(0.073)	(0.089)	(0.331)	(0.125)
4. Manufacturing Share (+)	-0.0204	0.2808	-0.2193	-0.1961	0.1358	-0.2578
	(0.169)	(0.212)	(0.213)	(0.191)	(0.15)	(0.24)
5. Trade Share (+)	0.0319	-0.0108	0.0486**	0.0431	0.0675*	0.0337
	(0.022)	(0.053)	(0.025)	(0.033)	(0.041)	(0.052)
6. Urban Population Share (+)	-0.0019***	-0.0149***	-0.0035***	0.0013	-0.0125***	-0.0002
	(0.001)	(0.004)	(0.001)	(0.001)	(0.004)	(0.002)
7. Log of per capita Real GDP	0.0611***	0.2167***	0.0578***	0.0448*	0.1451***	0.0279
	(0.017)	(0.047)	(0.017)	(0.026)	(0.041)	(0.032)
8. Government Crises (-)	-0.0023*	-0.0005	-0.0005	-0.0021*	-0.0021	-0.0017
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
9. Cost of Debt Servicing (-)	0.0159	0.0145	0.0109	0.0209	0.0572	0.0303
	(0.028)	(0.064)	(0.028)	(0.028)	(0.074)	(0.032)
10. Seigniorage (-)	-0.0866	-0.0985	-0.138*	-0.2125**	-0.1977	-0.214*
	(0.071)	(0.102)	(0.08)	(0.1)	(0.157)	(0.115)
Tax-Smoothing Variables						
11. Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0919***	-0.0468*	-0.0919***	-0.1443***	-0.0843***	-0.1484***
	(0.019)	(0.028)	(0.021)	(0.027)	(0.019)	(0.033)
12. Unanticipated changes in per capita real GDP (+) (4 year, simple average)	0.0917***	-0.0766	0.1069***	0.0912**	0.0201	0.1111**
	(0.022)	(0.053)	(0.026)	(0.037)	(0.049)	(0.05)
Bequest-Motives Variables						
13. Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.2015	-0.7456**	-0.3773	-0.0521	-0.7806**	0.0979
	(0.32)	(0.318)	(0.443)	(0.327)	(0.302)	(0.907)
14. Gini Coefficient (-) (adjusted, smoothed)	0.0004	0.0008	-0.0010	0.0004	0.0008	-0.001
	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.003)
15. Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0067	-0.0119	-0.0232**	0.0054	-0.0042	-0.0094
	(0.006)	(0.008)	(0.011)	(0.006)	(0.006)	(0.021)
16. constant	-0.3339**	-1.0336***	0.1347	-0.4854***	-0.5583	-0.0739
	(0.153)	(0.379)	(0.173)	(0.186)	(0.39)	(0.456)
R-squared	0.8187	0.8699	0.8338	0.8651	0.9330	0.8565
Adjusted R-squared	0.7872	0.8392	0.7903	0.8329	0.9112	0.7919
F-Statistic	185.47	49.58	269.79	1002.91	845.70	3951.29
F-Stat df 1	84	50	64	68	47	51
F-Stat df 2	495	212	252	302	148	122
Number of Countries	56	20	36	41	17	24
Number of Observations	582	263	319	375	197	178

Standard Errors are in parentheses.
*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively
Robust standard errors obtained using White's correction for heteroscedasticity.

Table 6.2a
Observations used for Developed Countries Panel Regression (Reg 1a)

	Countries	Years 1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Total no. of obs. for each country
1	Australia																			18
2	Austria																			14
3	Belgium																			18
4	Canada																			16
5	Denmark																			12
6	Finland																			11
7	France																			17
8	Greece																			8
9	Iceland																			17
10	Ireland																			5
11	Italy																			14
12	Japan																			18
13	Luxembourg																			9
14	NewZealand																			5
15	Norway																			13
16	Spain																			13
17	Sweden																			18
18	Switzerland																			3
19	UnitedKingdom																			18
20	UnitedStates																			16
	Total no. of obs. for each year	8	10	11	11	13	15	15	17	16	17	18	17	16	16	16	17	16	14	263

Table 6.2b
Observations used for Developing Countries Panel Regression (Reg 1b)

	Countries	Years 1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	Total no. of obs. for each country
1	Barbados																			5
2	Botswana																			5
3	Brazil																			7
4	Chad																			3
5	Chile																			5
6	CostaRica																			10
7	Cyprus																			18
8	Fiji																			3
9	Ghana																			9
10	Guatemala																			7
11	Honduras																			10
12	Indonesia																			8
13	Kenya																			5
14	Korea																			14
15	Malaysia																			13
16	Malta																			6
17	Mauritius																			11
18	Mexico																			13
19	Morocco																			12
20	Nepal																			1
21	Nigeria																			13
22	Papua New Guinea																			8
23	Paraguay																			2
24	Philippines																			16
25	Seychelles																			1
26	Singapore																			8
27	SouthAfrica																			15
28	Sri Lanka																			14
29	Tanzania																			4
30	Thailand																			15
31	Tunisia																			4
32	Turkey																			13
33	Uruguay																			16
34	Venezuela																			3
35	Zambia																			9
36	Zimbabwe																			13
	Total no. of obs. for each year	3	3	5	9	12	15	16	17	19	18	28	29	28	25	24	22	24	22	319

Table 6.3: Summary Statistics of Variables (1975-1992)

Variables	Obs	Mean	Std. Dev.	Min	Max
All Countries					
Surplus Share	1436	-0.040	0.063	-0.451	0.687
Index of Political Rights	1566	3.432	2.115	1.000	7.000
Agricultural Share	1507	0.156	0.128	0.002	0.690
Manufacturing Share	1441	0.171	0.073	0.003	0.420
Trade Share	1525	0.554	0.414	0.044	3.702
Urban Population Share	1566	52.042	24.480	3.500	100.000
Log of per capita Real GDP	1482	8.163	0.976	5.694	9.976
Government Crises	1503	0.457	1.094	0.000	7.000
Cost of Debt Servicing	783	-0.004	0.124	-1.575	1.133
Seigniorage	1487	0.022	0.037	-0.080	0.493
Unanticipated changes in real per capita govt exp	1210	0.012	0.165	-0.815	2.232
Unanticipated changes in per capita real GDP	1471	0.000	0.070	-0.338	0.538
Expected per capita real GDP Growth Rate	1194	0.027	0.017	-0.038	0.080
Gini Coefficient	818	41.442	8.901	21.472	63.430
Expectancy Longevity	1559	13.983	1.741	9.350	18.522
Developed Countries					
Surplus Share	395	-0.043	0.045	-0.233	0.105
Index of Political Rights	396	1.141	0.461	1.000	5.000
Agricultural Share	381	0.054	0.034	0.011	0.165
Manufacturing Share	373	0.207	0.055	0.030	0.341
Trade Share	396	0.547	0.316	0.132	1.732
Urban Population Share	396	73.569	14.627	27.660	96.720
Log of per capita Real GDP	393	9.317	0.291	8.384	9.801
Government Crises	378	0.606	1.152	0.000	5.000
Cost of Debt Servicing	296	0.001	0.017	-0.111	0.052
Seigniorage	387	0.009	0.016	-0.060	0.112
Unanticipated changes in real per capita govt exp	388	0.002	0.073	-0.265	0.716
Unanticipated changes in per capita real GDP	393	-0.002	0.034	-0.183	0.107
Expected per capita real GDP Growth Rate	395	0.032	0.012	0.011	0.080
Gini Coefficient	286	33.274	4.057	24.017	41.790
Expectancy Longevity	396	15.974	0.861	13.918	18.522
Developing Countries					
Surplus Share	1041	-0.039	0.069	-0.451	0.687
Index of Political Rights	1170	4.208	1.881	1.000	7.000
Agricultural Share	1126	0.190	0.129	0.002	0.690
Manufacturing Share	1068	0.158	0.075	0.003	0.420
Trade Share	1129	0.557	0.443	0.044	3.702
Urban Population Share	1170	44.756	22.801	3.500	100.000
Log of per capita Real GDP	1089	7.746	0.782	5.694	9.976
Government Crises	1125	0.407	1.070	0.000	7.000
Cost of Debt Servicing	487	-0.007	0.157	-1.575	1.133
Seigniorage	1100	0.026	0.041	-0.080	0.493
Unanticipated changes in real per capita govt exp	822	0.017	0.193	-0.815	2.232
Unanticipated changes in per capita real GDP	1078	0.000	0.079	-0.338	0.538
Expected per capita real GDP Growth Rate	799	0.024	0.019	-0.038	0.077
Gini Coefficient	532	45.834	7.604	21.472	63.430
Expectancy Longevity	1163	13.306	1.414	9.350	16.939

Table 6.4
Testing the Effect of Openness on the Gini Coefficient
Dependent Variable: Central Government Budget Surplus Share

Years : 1972 -1992	Developed 1975-1992 Reg 3a	Developing 1975-1992 Reg 3b	Developed 1975-1992 Reg 4a	Developing 1975-1992 Reg 4b
Control Variables				
1. Dependent Variable Lag 1	0.6861***	0.8173***	0.6912***	0.8227***
	(0.079)	(0.117)	(0.076)	(0.119)
2. Index of Political Rights	0.0155**	0.0035	0.0149**	0.0036
	(0.007)	(0.003)	(0.007)	(0.003)
3. Agricultural Share (-)	-0.2263	-0.0508	-0.2226	-0.0585
	(0.334)	(0.127)	(0.332)	(0.127)
4. Manufacturing Share (+)	0.1393	-0.2571	0.1334	-0.2771
	(0.148)	(0.231)	(0.148)	(0.24)
5. Trade Share (+)	-0.0669	-0.2756		
	(0.145)	(0.22)		
6. Urban Population Share (+)	-0.0119***	-0.0003	-0.0122***	-0.0002
	(0.004)	(0.002)	(0.004)	(0.002)
7. Log of per capita Real GDP	0.1472***	0.03	0.1463***	0.0254
	(0.04)	(0.032)	(0.04)	(0.032)
8. Government Crises (-)	-0.0017	-0.0028	-0.0019	-0.002
	(0.001)	(0.002)	(0.001)	(0.002)
9. Cost of Debt Servicing (-)	0.0473	0.0252	0.0507	0.0293
	(0.078)	(0.031)	(0.076)	(0.031)
10. Seigniorage (-)	-0.2023	-0.2028*	-0.1999	-0.2116*
	(0.158)	(0.122)	(0.157)	(0.117)
Tax-Smoothing Variables				
11. Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0824***	-0.1512***	-0.0833***	-0.1472***
	(0.02)	(0.032)	(0.019)	(0.032)
12. Unanticipated changes in per capita real GDP (+) (4 year, simple average)	0.0181	0.1164**	0.019	0.1091**
	(0.05)	(0.05)	(0.049)	(0.051)
Bequest-Motives Variables				
13. Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.8066***	0.1988	-0.7972***	0.1758
	(0.302)	(0.894)	(0.301)	(0.923)
14. Gini Coefficient (-) (adjusted, smoothed)	-0.001	-0.0049	-0.0001	-0.0015
	(0.002)	(0.004)	(0.001)	(0.003)
15. Trade Share interacted with Gini (+)	0.0047	0.007	0.0025*	0.0011
	(0.005)	(0.005)	(0.001)	(0.001)
16. Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0024	-0.0046	-0.0032	-0.0081
	(0.006)	(0.021)	(0.006)	(0.021)
17. constant	-0.7079*	0.0806	-0.6907*	-0.0788
	(0.397)	(0.446)	(0.392)	(0.45)
R-squared	0.9334	0.8606	0.9333	0.8575
Adjusted R-squared	0.9112	0.7961	0.9116	0.7933
Number of Countries	17	24	17	24
Number of Observations	197	178	197	178

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table 6.5a
Accounting for Differences in Budget Surplus Shares of GDP
Changes Over Time, Average over Several Developed Countries

Explanatory Variables	Actual Change 1975-83 (2)	Estimated Coefficient 1975-92 (3)	Estimated Change in Surplus Share 1975-83 (2) x (3) = (4)	Actual Change 1983-92 (5)	Estimated Coefficient 1975-92 (6)	Estimated Change in Surplus Share 1983-92 (5) x (6) = (7)
Control Variables						
Lagged Dep Var.	-0.0409	0.4137	-0.016915	0.0245	0.4137	0.010154
Political Rights	-0.5000	0.0216	-0.010815	-0.0455	0.0216	-0.000983
Agricultural Share	-0.0162	-0.1161	0.001883	-0.0151	-0.1161	0.001755
Manufacturing Share	-0.0349	0.2808	-0.009799	-0.0212	0.2808	-0.005946
Trade Share	0.0619	-0.0108	-0.000669	-0.0628	-0.0108	0.000680
Urban Population Share	1.6241	-0.0149	-0.024148	1.3264	-0.0149	-0.019721
Log of per capita Real GDP	0.1339	0.2167	0.029028	0.2540	0.2167	0.055058
No. of Govt Crises	-0.8095	-0.0005	0.000422	-0.2857	-0.0005	0.000149
Cost of Debt Servicing	0.0110	0.0145	0.000159	0.0059	0.0145	0.000085
Seignorage	-0.0015	-0.0985	0.000149	-0.0098	-0.0985	0.000966
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt exp (4 year, simple average)	-0.1095	-0.0468	0.005126	0.0068	-0.0468	-0.000316
Unanticipated changes in per capita real GDP (4 year, simple average)	0.0625	-0.0766	-0.004788	-0.0218	-0.0766	0.001671
Bequest Motives Variables						
Expected per capita Growth Rate (25 previous years)	-0.0051	-0.7456	0.003797	-0.0113	-0.7456	0.008431
Gini Coefficient (adjusted, smoothed)	-1.1825	0.0008	-0.000962	-2.1899	0.0008	-0.001782
Life Expectancy at age 65 (estimated by Method 2)	0.8219	-0.0119	-0.009763	1.0493	-0.0119	-0.012465
Actual Change in Budget Surplus Share	-0.0146			0.0195		
Total Estimated Change in Budget Surplus Share			-0.0373			0.0377
Ratio of Estimated to Actual Surplus Share (%)			254.73			193.28
Tax-Smoothing : Total Effect TS : Contribution (%)			0.0003 -2.31			0.0014 6.94
Bequest Motives : Total Effect BM : Contribution (%)			-0.0069 47.32			-0.0058 -29.79

Table 6.5b
Accounting for Differences in Budget Surplus Shares of GDP Changes Over Time, Average over Several Developing Countries

Explanatory Variables	Actual Change 1975-83 (2)	Estimated Coefficient 1975-92 (3)	Estimated Change in Surplus Share 1975-83 (2) x (3) = (4)	Actual Change 1983-92 (5)	Estimated Coefficient 1975-92 (6)	Estimated Change in Surplus Share 1983-92 (5) x (6) = (7)
Control Variables						
Lagged Dep Var	-0.0385	0.7118	-0.027439	0.0296	0.7118	0.021060
Political Rights	-0.4041	3.61E-05	-0.000015	-0.4769	3.61E-05	-0.000017
Agricultural Share	-0.0324	-0.0910	0.002952	-0.0196	-0.0910	0.001783
Manufacturing Share	-0.0028	-0.2193	0.000605	0.0088	-0.2193	-0.001933
Trade Share	-0.0383	0.0486	-0.001861	0.0285	0.0486	0.001387
Urban Population Share	4.7318	-0.0035	-0.016352	5.6314	-0.0035	-0.019460
Log of per capita Real GDP	0.1507	0.0578	0.008702	-0.0269	0.0578	-0.001552
No. of Govt Crises	-0.9558	-0.0005	0.000481	0.0000	-0.0005	0.000000
Cost of Debt Servicing	-0.0350	0.0109	-0.000381	0.0266	0.0109	0.000289
Seignorage	0.0016	-0.1380	-0.000218	-0.0097	-0.1380	0.001334
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt exp (4 year, simple average)	-0.1728	-0.0919	0.015872	0.0893	-0.0919	-0.008201
Unanticipated changes in per capita real GDP (4 year, simple average)	0.0159	0.1069	0.001697	0.0126	0.1069	0.001342
Bequest Motives Variables						
Expected per capita Growth Rate (25 previous years)	0.0065	-0.3773	-0.002434	-0.0128	-0.3773	0.004811
Gini Coefficient (adjusted, smoothed)	0.0136	-0.0010	-0.000014	-0.0319	-0.0010	0.000032
Life Expectancy at age 65 (estimated by Method 2)	-0.1355	-0.0232	0.003146	1.1861	-0.0232	-0.027532
Actual Change in Budget Surplus Share	-0.0236			0.0252		
Total Estimated Change in Budget Surplus Share			-0.0153			-0.0267
Ratio of Estimated to Actual Surplus Share (%)			64.55			-105.90
Tax-Smoothing : Total Effect			0.0176			-0.0069
TS : Contribution (%)			-74.33			-27.25
Bequest Motives : Total Effect			0.0007			-0.0227
BM : Contribution (%)			-2.95			-90.14

Table 6.6
Accounting for Differences in Budget Surplus Shares of GDP
Differences Between Developed and Developing Countries

Explanatory Variables	1975 Actual Difference (2)	1975 Estimated Coefficient (3)	1975 Estimated Difference in Surplus Share (2) x (3) = (4)	1992 Actual Difference (5)	1992 Estimated Coefficient (6)	1992 Estimated Difference in Surplus Share (5) x (6) = (7)
Control Variables						
Lagged Dep Var	0.0004	0.6922	0.000265	-0.0070	0.6922	-0.004842
Political Rights	-3.0586	0.0011	-0.003234	-2.7231	0.0011	-0.002879
Agricultural Share	-0.1487	-0.1115	0.016587	-0.1280	-0.1115	0.014281
Manufacturing Share	0.0785	-0.0204	-0.001600	0.0164	-0.0204	-0.000334
Trade Share	-0.0740	0.0319	-0.002358	-0.0652	0.0319	-0.002078
Urban Population Share	32.2642	-0.0019	-0.060563	24.8515	-0.0019	-0.046649
Log of per capita Real GDP	1.5341	0.0611	0.093807	1.7983	0.0611	0.109959
No. of Govt Crises	0.1131	-0.0023	-0.000259	-0.0264	-0.0023	0.000060
Cost of Debt Servicing	-0.0367	0.0159	-0.000584	-0.0114	0.0159	-0.000181
Seignorage	-0.0132	-0.0866	0.001142	-0.0164	-0.0866	0.001422
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt exp (4 year, simple average)	-0.0223	-0.0919	0.002048	-0.0415	-0.0919	0.003814
Unanticipated changes in per capita real GDP (4 year, simple average)	-0.0194	0.0917	-0.001779	-0.0072	0.0917	-0.000656
Bequest Motives Variables						
Expected per capita Growth Rate (25 previous years)	0.0169	-0.2015	-0.003409	0.0068	-0.2015	-0.001374
Gini Coefficient (adjusted, smoothed)	-12.0646	0.0004	-0.005228	-15.4187	0.0004	-0.006681
Life Expectancy at age 65 (estimated by Method 2)	1.9509	-0.0067	-0.012989	2.7716	-0.0067	-0.018453
Actual Difference in Budget Surplus Share	-0.0176			-0.0143		
Total Estimated Difference in Budget Surplus Share			0.0218			0.0454
Ratio of Estimated to Actual Surplus Share (%)			-123.96			-318.06
Tax-Smoothing : Total Effect			0.0003			0.0032
TS : Contribution (%)			-1.53			-22.12
Bequest Motives : Total Effect			-0.0216			-0.0265
BM : Contribution (%)			122.71			185.67

Table 6.7a
Accounting for Differences in Budget Surplus Shares of GDP
Differences Between Developed Countries

Difference between these countries and the U.S.	Estimated Effect on the Difference in Budget Surplus Shares							
	1980				1985			
	Italy	United Kingdom	Australia	France	Belgium	Canada	Finland	Norway
Control Variables								
Lagged Dependent Variable	-0.0363	-0.0188	-0.0060	-0.0017	-0.0340	-0.0064	0.0164	0.0281
Political Rights	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0216	0.0000
Agricultural Share	-0.0039	0.0007	-0.0033	-0.0021	-0.0002	-0.0010	-0.0061	-0.0011
Manufacturing Share	0.0193	0.0063	-0.0058	0.0085	0.0060	-0.0073	0.0096	-0.0194
Trade Share	-0.0024	-0.0027	-0.0011	-0.0022	-0.0130	-0.0038	-0.0039	-0.0046
Urban Population Share	0.1056	-0.2238	-0.1787	0.0064	-0.3200	-0.0277	0.2183	0.0445
Log Real GDP per capita	-0.0844	-0.0865	-0.0376	-0.0542	-0.0833	-0.0132	-0.0690	-0.0343
Number of Govt Crises	-0.0016	0.0000	0.0000	0.0000	-0.0010	0.0000	0.0000	0.0000
Cost of Debt Servicing	-0.0003	0.0001	-0.0002	-0.0001	-0.0002	-0.0001	-0.0001	0.0001
Seignorage	-0.0015	0.0005	-0.0002	-0.0006	0.0006	0.0002	-0.0001	0.0001
Tax-Smoothing Variables								
Unanticipated changes in real per capita govt expenditures (4 year, simple average)	0.0034	0.0013	0.0029	0.0021	0.0026	0.0034	0.0007	0.0009
Unanticipated changes in per capita real GDP (4 year, simple average)	-0.0048	-0.0003	-0.0050	-0.0017	0.0004	-0.0023	0.0004	-0.0001
Bequest Motives Variables								
Expected per capita Growth Rate (25 year construction)	-0.0145	0.0004	-0.0027	-0.0124	-0.0088	-0.0107	-0.0105	-0.0132
Gini Coefficient (adjusted, smoothed)	-0.0009	-0.0090	0.0026	0.0003	-0.0086	-0.0048	-0.0065	-0.0041
Life Expectancy at age 65 (estimated by Method 2)	-0.0012	-0.0005	-0.0039	-0.0029	-0.0037	-0.0123	0.0006	-0.0109
Actual Difference in the Budget Surplus Share	-0.0714	-0.0217	0.0100	0.0240	-0.0595	-0.0083	0.0435	0.0852
Total Estimated Difference in Budget Surplus Share	-0.0235	-0.3323	-0.2389	-0.0604	-0.4631	-0.0857	0.1713	-0.0141
Ratio of Predicted to Actual Budget Surplus Share (%)	32.93	1529.81	-2399.36	-251.50	778.49	1029.74	393.47	-16.51
Tax-Smoothing : Total Effect	-0.0013	0.0011	-0.0021	0.0004	0.0030	0.0012	0.0011	0.0008
Tax-Smoothing : Contribution (%)	1.87	-4.89	-21.20	1.76	-5.06	-13.96	2.47	0.95
Bequest Motives : Total Effect	-0.01659	-0.00911	-0.00396	-0.01495	-0.02109	-0.02769	-0.01639	-0.02827
Bequest Motives : Contribution (%)	23.25	41.92	-39.80	-62.22	35.45	332.63	-37.66	-33.17

Table 6.7b
Accounting for Differences in Budget Surplus Shares of GDP
Differences Between Developing Countries

Difference between these countries and South Korea	Estimated Effect on the Difference in Budget Surplus Shares: 1980 Sri Lanka	1980 Malaysia	1980 Philippines	1985 Brazil	1985 Malaysia	1985 Costa Rica	1985 Venezuala
Control Variables							
Lagged Dependent Variable	-0.0732	-0.0112	0.0112	-0.0265	-0.0346	0.0073	0.0319
Political Rights	-0.0001	-0.0001	0.0000	0.0000	0.0000	-0.0001	-0.0001
Agricultural Share	-0.0100	-0.0065	-0.0094	0.0018	-0.0062	-0.0058	0.0059
Manufacturing Share	0.0255	0.0167	0.0056	-0.0030	0.0238	0.0159	0.0145
Trade Share	0.0066	0.0163	-0.0099	-0.0229	0.0116	-0.0060	-0.0134
Urban Population Share	0.1220	0.0514	0.0670	-0.0201	0.0656	0.0691	-0.0588
Log Real GDP per capita	-0.0369	0.0130	-0.0287	-0.0028	-0.0010	-0.0162	0.0225
Number of Govt Crises	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Cost of Debt Servicing	-0.0002	0.0000	0.0000	-0.0001	0.0014	0.0000	0.0001
Seignorage	-0.0031	-0.0034	-0.0019	-0.0036	-0.0011	-0.0068	-0.0004
Tax-Smoothing Variables							
Unanticipated changes in real per capita govt expenditures (4 year, simple average)	-0.0084	-0.0335	-0.0188	-0.0285	-0.0040	0.0176	-0.0140
Unanticipated changes in per capita real GDP (4 year, simple average)	0.0170	0.0198	0.0138	0.0091	-0.0088	0.0038	0.0034
Bequest Motives Variables							
Expected per capita Growth Rate (25 year construction)	0.0198	0.0073	0.0138	0.0102	0.0069	0.0178	0.0189
Gini Coefficient (adjusted, smoothed)	-0.0057	-0.0130	-0.0099	-0.0227	-0.0135	-0.0097	-0.0096
Life Expectancy at age 65 (estimated by Method 2)	-0.0052	-0.0001	0.0219	0.0172	-0.0009	-0.0333	-0.0050
Actual Difference in the Budget Surplus Share	-0.1604	-0.0472	0.0084	-0.1001	-0.0454	0.0205	0.0641
Total Estimated Difference in Budget Surplus Share	0.0505	0.0592	0.0571	-0.0895	0.0417	0.0562	-0.0016
Ratio of Predicted to Actual Budget Surplus Share (%)	-31.45	-125.43	676.30	89.35	-91.79	274.85	-2.51
Tax Smoothing : Total Effect	0.0085	-0.0138	-0.0051	-0.0194	-0.0128	0.0214	-0.0107
TS Contribution (%)	-5.32	29.17	-59.87	19.38	28.24	104.79	-16.65
Bequest Motives : Total Effect	0.00892	-0.00585	0.02578	0.00471	-0.00752	-0.02520	0.00428
BM Contribution (%)	-5.56	12.40	305.31	-4.70	16.57	-123.19	6.68

APPENDIX

A1. List of Countries

The 87 countries included in the sample are:

Algeria, Argentina, Australia, Austria, Bahrain, Bangladesh, Barbados, Belgium, Bhutan, Bolivia, Botswana, Brazil, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, Colombia, Cote d'Ivoire, Costa Rica, Cyprus, Denmark, Dominican Republic, Ecuador, Egypt, Fiji, Finland, France, Gabon, Ghana, Greece, Guatemala, Guinea, Honduras, Hungary, Iceland, India, Indonesia, Iran, Ireland, Italy, Israel, Jamaica, Japan, Jordan, Kenya, South Korea, Kuwait, Luxembourg, Malawi, Malaysia, Maldives, Malta, Mauritius, Mexico, Morocco, Nepal, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Philippines, Portugal, Romania, Seychelles, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Tanzania, Thailand, Tunisia, Turkey, Great Britain, United States, Uruguay, Venezuela, Zambia, Zimbabwe

A2. Sensitivity Analyses

In order to assess the robustness of our regression results presented in this paper, different regression specifications were estimated as sensitivity analyses. These specifications differed from one another in that different construction methods or proxies for were used for one or more of the independent variables.

A2.1 Various Methods of Constructing Tax-Smoothing Variables

Recall that tax-smoothing variables are constructed as percentage deviations of current levels of per capita real government expenditure or output from their respective expected levels. The expected level of per capita real output in year *t* was constructed by projecting the level per capita output in year *t*-1 one year forward, using the simple average of the previous 3 years' growth rates of per capita real government expenditure. The construction of unanticipated changes in per capita real government expenditure is identical.

Table A1a and A1b presents the results of the regressions where the number of previous years used in obtaining the average annual growth rate both tax-smoothing variables is varied. Table A1a presents the results when the missing data technique is used while Table A1b gives the results of the normal fixed effects panel regressions. Specification pairs Reg 1, 2 and 3 of both tables use 4, 6 and 8 previous years respectively, to derive the annual growth rates. Note that the use of the previous 4, 6 and 8 years is equivalent to using the annual growth rates of previous 3, 5 and 7 years to obtain measures of the average growth rate.

Referring to Table A1a, we see that regardless of the number of years used in constructing the average annual growth rates of the two tax-smoothing variables, the coefficients of both tax-smoothing variables are always of the correct signs and significant at the 99 percent confidence level for the developing countries. This is not so for the developed countries. For these countries, while the coefficient for unanticipated changes in per capita real government expenditure is still significant, at least at the 90 percent confidence level, the coefficient for unanticipated changes in output is consistently insignificant. A quick comparison with Table A1b reveals that the lack of empirical support of the tax-smoothing hypothesis in the developed countries also holds when using the normal panel regressions.

To provide a further test of robustness, we estimate specifications that use an alternative method of obtaining expected growth rates of per capita real government expenditure and output in Tables A2a and A2b. The expected annual growth rates of both variables are now constructed instead using the OLS slope coefficients obtained when the log value of the variables are regressed on time. For example, the expected growth rate of per capita output is the resulting slope coefficient when log of per capita output is regressed on time. The number of previous years to be used in estimating the expected growth rate remains arbitrary. Tables A2a and A2b present the regression results where the number of previous years used is varied. Specification pairs Reg 4, 5 and 6 uses 4, 6 and 8 previous years respectively, to estimate the expected annual growth rates[39].

We see that this alternative method of obtaining expected growth rates has little or no qualitative effect on the results. Regardless of whether the panel regressions employ or do not employ the missing data technique, the results show that tax smoothing is evidenced only in the developing countries and not in the developed countries.

It is also noted that the coefficients of the bequest motive variables are not too sensitive to the method of constructing the tax-smoothing variables. Focusing on the results of the missing data technique regressions in Table A1a and A2a, the 6 different methods of constructing the tax-smoothing variables result in the developed countries consistently exhibiting the same qualitative results. Only the coefficients of the expected growth rate and expected longevity variables return the theoretically expected negative sign, but only that of the former is statistically significant. As for the developing countries, the bequest motive variables return coefficients that are all negative

[39] Note that the use of the previous 4, 6 and 8 years is equivalent to using information on the annual growth rates of previous 3, 5 and 7 years to obtain a measure of an "average" growth rate.

but only that for life expectancy at 65 is statistically significant. The exception is when 8 previous years are used to construct the expected growth rates of the tax-smoothing variables (TS MD Reg 3b and 6b). The coefficient of the life expectancy at 65 then becomes insignificant but remains negative.

The above has shown that the qualitative results of the panel regressions are largely invariant to different construction methods of the expected growth rate components of the tax-smoothing variables. Given the potential volatility of budget balances, the preferred number of previous periods is 4 years. In addition, given that one can easily anticipate objections to the validity of regressions that utilize only 4 observations, the 4year simple average method of constructing expected growth rates will be used for this paper.

A2.2 Variation in the Length of Time Period used in the Construction of Expected Per-Capita Real GDP Growth Rate

Using the "chosen" 4-year simple average annual growth rate method for constructing the tax-smoothing variables, we now look at specifications using various time period lengths for constructing the bequest motive variable: expected per capita growth rate. These results are presented in Tables A3a and A3b. As above, the former table presents the results for the panel regressions that use the missing data technique, while the latter presents the results of the normal panel regressions.

In BM MD Reg 1a, 1b and BM Reg 1a, 1b each observation for the expected per capita real GDP growth rate is the slope coefficient obtained when the log values of real GDP per capita of the previous 15 years are regressed on a time trend. The same "rolling regression" methodology is applied to specification pairs BM MD Reg 2, 3 and 4 except that real GDP per capita for the previous 20 years, 25 years and 30 years were used respectively[40].

The theory of negative bequest motives postulates that the higher the expected economic growth rate, the higher the expected standard of living of the future generation. This will tend to increase the population share of bequest-constrained individuals in the current generation, leading to a larger budget deficit. Since the purpose of this variable is to represent the expectations of the current generation with regard to the standard of living of future generations, it is imperative that a relatively long-run measure of the growth rate is used. For this reason, only data from the previous 15 years or longer were used.

[40] We were not able to extend beyond 30 years due to data constraints.

Firstly, note that both Tables A3a and A3b again illustrate the robustness of the tax-smoothing results obtained in the previous section. We see that the statistical significance of the tax-smoothing variables for the developing countries are unaffected by the variation in the number of years used in the expected growth rate (bequest motive variable) construction. Tax-smoothing continues to be evident among the developing countries but not among the developed countries.

We see that from Table A3a varying the number of years used in the construction of the expected growth rate produces substantial qualitative changes on the coefficients of the bequest motive regressors. It is true that all coefficients of the bequest motive variables return the theoretically postulated negative sign, with the exception being that of the Gini variable of the developed countries, which generally returns an insignificant positive coefficient. However, these bequest motive coefficients generally tend to be insignificant, with a few exceptions. For the developed countries, the coefficient of the expected growth rate variable is significant only when 25 previous years are used in the construction of the expected growth rate variable (BM MD Reg 3a). As for the developing countries, the expected growth rate variable is significant only for the 30-year construction (BM MD Reg 4b) and the life expectancy variable is significant for the 25-year and 30-year constructions (BM MD Reg 3b and 4b).

I argue that the insignificance of the bequest motive variables for the shorter 15-year and 20-year constructions indicate that 15 or 20 years is not sufficiently long to accurately predict the long-run expected growth rate of the economy and consequently the standard of living of the next generation. On the other hand, using such a long period of 30 years would lead to some concern as it is likely to render the measure to be very insensitive to recent changes in the expected growth rates[41]. In addition, we also note that the 25-year construction gives the highest R-squared and adjusted R-squared relative to the rest of the specifications. Based on the above, the 25-year "rolling regression" is the preferred method for the construction of the expected growth rate variable.

It can be seen that when the missing data technique is not employed, the regression results differ substantially from those when the missing data is employed. In Table A3b, the developed country coefficient for the expected growth rate variable is consistently highly significant across the 4 different time interval lengths used for the construction of the expected growth rate variable. In contrast, the other bequest motive variables remain consistently insignificant. However, the missing data technique allows all of the independent variables, excluding the Gini coefficient, to be estimated more efficiently. I therefore believe that the coefficients from Table A3b are less accurately measured and this is the reason for the inconsistencies between the results in the two tables.

A2.3 Different Measures of the Gini Coefficient

The theory of negative bequest motives postulates that increases in the spread of the income distribution tends to increase the proportion of very poor people at one end of the distribution, and capital owners at the other. As such, increases in the income distribution tend to increase the budget deficit. The Gini coefficient will be used as a measure of income distribution and will be obtained from the Deininger-Squire data set. Since it is very plausible that any true income distribution will change very slowly over time, all of the following Gini measures have been linearly interpolated against time to increase the number of observations.

Tables A4a and A4b present the results when different measures of the Gini are used. Specification pair 4 from both tables use the Gini coefficient in which no adjustment is made for any difference between income and expenditure based Gini coefficients. Specification pair 5 from both tables include the adjustment for differences between income and expenditure based Ginis. As suggested by Deininger and Squire, the mean difference of 6.6 between the income and expenditure based Ginis is added to the expenditure based Gini coefficients to make them more comparable to the income-based Gini coefficients.

In order to minimize the effect of extreme observations, the available adjusted Gini coefficient data were smoothed using locally weighted scatterplot smoothing (lowess)[42] and the panel regressions were then estimated using the new smoothed Ginis. The results of the regressions using these "adjusted and smoothed" Gini coefficients are presented as Reg A6a and A6b in both tables.

The results of the regressions using the different measures of the Gini coefficient reveal that there are very little qualitative and quantitative differences in the coefficients of both the tax-smoothing and bequest motive variables. This is the case regardless of whether the missing data technique was employed or not. However, for the reasons mentioned above, I find that the "adjusted and smoothed" Gini coefficient is conceptually most appealing, and will serve as the "chosen" measure of the spread of the income distribution.

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[41] While it is true that the expected growth rate variable is focused on capturing the effects of long-run economic growth on the budget deficit, we do not want to totally exclude the effects of short-run output fluctuations. This is because such transitory fluctuations are likely to have some effect on long –run expectations.

[42] A bandwidth of 0.5 was used.

A2.4 Different Proxies for Expected Longevity

According to the negative bequest motive theory, increases in longevity will tend to increase the amount of resources required for consumption. This consequently will increase the population share of bequest-constrained individuals, leading to a larger budget deficit.

Tables A5a and A5b present the regressions results when various proxies for expected longevity are used. Life expectancy at birth was used in specification pair 8 in both tables and life expectancy at 65 was used in specification pair 9 in both tables. In addition, in an attempt to increase the number of observations for life expectancy at age 65, we used two slightly different methods of obtaining predicted values of life expectancy at age 65 from data on life expectancy at birth. In both tables, these predicted values from Method 1 were then used in specification pair 10, while predicted values from Method 2 were used in specification pair 11.

Figure A1 presents the locally weighted scatterplot smoothing (lowess) plot of life expectancy at age 65 against life expectancy at birth for the years 1950 to 1997. We see that there exists a distinct break in the relationship between the two life expectancies when life expectancy at birth is about 70 years. Stratifying the data by decades (Figures A1a to A1e), we see that in every decade the relationship between the two life expectancies very similar: it is approximately linear with a kink occurring at the point where life expectancy at birth is about 70 years. Given this, two linear relationships between the life expectancies should to be estimated: one if life expectancy at birth is less than or equal to 70 years and another if life expectancy is greater than 70 years. In addition, since we expect medical advances to influence the relationship between the two life expectancies, the data should be first stratified by decades. As such, in Method 1 the data is first separated by decades and then by whether life expectancy at birth is less than (or equal to) or greater than 70 years. The predicted values of life expectancy at age 65 are then obtained by regressing linearly life expectancy at age 65 on life expectancy at birth. As a result, a total of 8 linear relationships are estimated, the results of which are presented in Table A3.6a. The predicted values[43] of life expectancy at age 65 obtained are then smoothed and linearly interpolated, before they are used in regression specification pair 10.

The second method of obtaining predicted values of life expectancy at age 65 is very similar. For both cases of life expectancy at birth less than and greater than 70 years, casual inspection of Figures A1a through A1e reveals the possibility of a quadratic relationship existing between the two life expectancies. Statistical tests show that there is little evidence of a quadratic

[43] To account for possible discontinuities in the predicted values of life expectancy at age 65, the predicted values were first smoothed using lowess before they were used in the main budget surplus share regressions. A bandwidth of 0.1 was used for the first 2 decades and a bandwidth of 0.4 was used for the later 3 decades.

relationship between the two life expectancies when life expectancy at birth is less than or equal to 70 years[44]. As for the case of when life expectancy at birth is greater than 70 years, statistically significant quadratic relationships were found for the periods 1980-89 and 1990-97[45]. In addition, tests of structural breaks were conducted at the end of every decade. For the case when life expectancy is equal to or less than 70 years, we found that there exists structural breaks at the years 1960, 1970, 1980 and 1990. For the situation when life expectancy at birth exceeds 70 years, a structural break was found only at 1990. As such, when life expectancy at birth is below or equal 70 years, I will estimate the values of life expectancy at 65 in same way as in Method 1. When life expectancy at birth exceeds 70 years, I estimate a single linear relationship for the years 1950-79, and quadratic specifications for 1980-89 and 1990-97. The results are presented in Table A6b. The predicted values are then smoothed[46] and linearly interpolated, and then used in specification pair 11.

We see that varying the various measures of expected longevity do not substantially alter the qualitative and quantitative results of the panel regressions. Regardless of using Method 1 or 2 for estimating life expectancy at age 65 from life expectancy at birth, we see that the qualitative results of the tax-smoothing and bequest motive variables still holds.

The only exception may be that of using life expectancy at age 65 (Reg 9a and 9b). We see that for the developed countries, in addition to the significant negative coefficient of the expected growth rate variable, the coefficient of the life expectancy variable remains negative but becomes significant. I take this as an indication that the estimates of life expectancy at age 65 from life expectancy at birth are still not as good a proxy of expected longevity as the actual values of life expectancy at 65. However, while there are sufficient observations of life expectancy at 65 to carry out the surplus share panel regressions for the developed countries, there are insufficient observations for the developing countries. To maintain uniformity of the independent variables used in the panel regressions for developed and developing countries, and given the rather "rigorous" Method 2 construction of estimated life expectancy at age 65, Method 2 is used as the measure of expected longevity for this paper.

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[44] The decade of 1960 to 1969 was the only decade to exhibit a significant coefficient for the square of life expectancy at birth. From Figure A1b, it is difficult to identify an obvious quadratic relationship between the two life expectancies when life expectancy at birth is less than 70 years. As such, we continue to assume the linear specification between the two life expectancies, as in Method 1.

[45] We also attempted to fit a quadratic specification for all observations in a decade, that is, without the assumed structural break at the point when life expectancy at birth reaches 70 years. However, this resulted in non-monotonic relationships between the two life expectancies. At very low levels of life expectancy at birth, the estimated life expectancies at age 65 would be relatively high.

[46] To account for possible discontinuities in the predicted values of life expectancy at age 65, the predicted values were first smoothed using lowess before they were used in the main panel regressions for budget surplus shares.

Table A1a

Sensitivity Analysis : Tax Smoothing Variables (Simple Average Growth Rate)

Fixed (Country & Time) Effects Panel Regressions -- Missing Data Technique

Dependent Variable: Central Government Budget Surplus Share

	Number of Previous Years Used in Constructing Simple Average Growth Rate					
	4 years		6 years		8 years	
	Developed	Developing	Developed	Developing	Developed	Developing
Years : 1975 -1992	TS MD Reg 1a	TS MD Reg 1b	TS MD Reg 2a	TS MD Reg 2b	TS MD Reg 3a	TS MD Reg 3b
Control Variables						
Dependent Variable Lag 1	0.4137***	0.7118***	0.4235***	0.5954***	0.4190***	0.6523***
	(0.134)	(0.083)	(0.14)	(0.09)	(0.137)	(0.099)
Index of Political Rights	0.0216**	3.61E-05	0.0219**	0.0016	0.0223**	0.0032*
	(0.009)	(0.002)	(0.009)	(0.002)	(0.01)	(0.002)
Agricultural Share (-)	-0.1161	-0.091	-0.0755	-0.0386	-0.082	-0.0666
	(0.278)	(0.073)	(0.286)	(0.088)	(0.293)	(0.096)
Manufacturing Share (+)	0.2808	-0.2193	0.2636	-0.2029	0.2745	-0.1396
	(0.212)	(0.213)	(0.217)	(0.217)	(0.214)	(0.169)
Trade Share (+)	-0.0108	0.0486**	-0.0089	0.0491**	-0.0071	0.033*
	(0.053)	(0.025)	(0.054)	(0.024)	(0.055)	(0.017)
Urban Population Share (+)	-0.0149***	-0.0035***	-0.0144***	-0.003***	-0.0138***	-0.0027***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.005)	(0.001)
Log of per capita real GDP (+)	0.2167***	0.0578***	0.2184***	0.0602***	0.2243***	0.046***
	(0.04[illegible])	(0.017)	(0.051)	(0.019)	(0.051)	(0.016)
Government Crises (-)	-0.0005	-0.0005	-0.0009	-0.0003	-0.001	-0.0002
	(0.00[illegible])	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cost of Debt Servicing (-)	0.0145	0.0109	0.0305	-0.001	0.0305	0.0097
	(0.06[illegible])	(0.028)	(0.065)	(0.029)	(0.067)	(0.031)
Seigniorage (-)	-0.0985	-0.138*	-0.0771	-0.1556*	-0.0725	-0.1515*
	(0.102)	(0.08)	(0.099)	(0.086)	(0.098)	(0.088)
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt expenditure (-)	-0.0468*	-0.0919***	-0.0627*	-0.0768***	-0.074**	-0.1314***
	(0.028)	(0.021)	(0.033)	(0.028)	(0.036)	(0.039)
Unanticipated changes in per capita real GDP (+)	-0.0766	0.1069***	-0.0612	0.0846***	-0.0695	0.1217***
	(0.053)	(0.026)	(0.069)	(0.03)	(0.076)	(0.035)
Bequest-Motives Variables						
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7456**	-0.3773	-0.7578**	-0.1925	-0.7312*	-0.1138
	(0.318)	(0.443)	(0.34)	(0.447)	(0.382)	(0.442)
Gini Coefficient (-) (adjusted, smoothed)	0.0008	-0.001	0.0011	-0.0008	0.0013	-0.0018
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0119	-0.0232**	-0.0101	-0.0227*	-0.0095	-0.0155
	(0.008	(0.011)	(0.009)	(0.012)	(0.008)	(0.01)
constant	-1.0336***	0.1347	-1.1116***	-0.0905	-1.2147***	0.1069
	(0.379)	(0.173)	(0.417)	(0.134)	(0.431)	(0.191)
R-squared	0.8699	0.8338	0.8749	0.8281	0.8738	0.8510
Adjusted R-squared	0.8392	0.7903	0.8449	0.7818	0.8428	0.8092
F-Statistic	49.58	269.79	53.62	813.40	48.66	30.54
F-Stat df 1	50	64	50	63	50	63
F-Stat df 2	212	252	208	241	204	288
Number of Countries	20	36	20	35	20	34
Number of Observations	263	319	259	307	255	293

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A1b

Sensitivity Analysis : Tax Smoothing Variables (Simple Average Growth Rate)

Fixed (Country & Time) Effects Panel Regressions

Dependent Variable: Central Government Budget Surplus Share

	Number of Previous Years Used in Constructing Simple Average Growth Rate					
	4 years		6 years		8 years	
Years : 1975 -1992	Developed TS Reg 1a	Developing TS Reg 1b	Developed TS Reg 2a	Developing TS Reg 2b	Developed TS Reg 3a	Developing TS Reg 3b
Control Variables						
Dependent Variable Lag 1	0.6932*** (0.078)	0.8202*** (0.12)	0.7371*** (0.078)	0.8056*** (0.111)	0.7217*** (0.075)	0.7874*** (0.114)
Index of Political Rights	0.0144** (0.007)	0.0036 (0.003)	0.0146** (0.006)	0.0015 (0.003)	0.0142** (0.006)	0.0013 (0.003)
Agricultural Share (-)	-0.208 (0.331)	-0.0686 (0.125)	-0.2228 (0.323)	-0.0717 (0.128)	-0.209 (0.322)	-0.0858 (0.133)
Manufacturing Share (+)	0.1358 (0.15)	-0.2578 (0.24)	0.1154 (0.146)	-0.2702 (0.212)	0.1225 (0.148)	-0.2345 (0.212)
Trade Share (+)	0.0675* (0.041)	0.0337 (0.052)	0.0506 (0.038)	0.0231 (0.045)	0.0449 (0.037)	0.0287 (0.046)
Urban Population Share (+)	-0.0125*** (0.004)	-0.0002 (0.002)	-0.011*** (0.003)	-0.0004 (0.002)	-0.0107*** (0.003)	-0.0005 (0.002)
Log of per capita real GDP (+)	0.1451*** (0.041)	0.0279 (0.032)	0.1274*** (0.041)	0.0272 (0.031)	0.1255*** (0.041)	0.0303 (0.031)
Government Crises (-)	-0.0021 (0.001)	-0.0017 (0.002)	-0.0026* (0.001)	-0.0017 (0.002)	-0.0031** (0.001)	-0.002 (0.002)
Cost of Debt Servicing (-)	0.0572 (0.074)	0.0303 (0.032)	0.0871 (0.074)	0.0204 (0.027)	0.09 (0.072)	0.0254 (0.033)
Seigniorage (-)	-0.1977 (0.157)	-0.214* (0.115)	-0.1744 (0.146)	-0.1344 (0.108)	-0.1677 (0.14)	-0.1795 (0.117)
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt expenditure (-)	-0.0843*** (0.019)	-0.1484*** (0.033)	-0.111*** (0.021)	-0.1704*** (0.034)	-0.1219*** (0.021)	-0.1717*** (0.035)
Unanticipated changes in per capita real GDP (+)	0.0201 (0.049)	0.1111** (0.05)	0.0813 (0.056)	0.1276*** (0.048)	0.0832 (0.057)	0.0968* (0.057)
Bequest-Motives Variables						
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7806** (0.302)	0.0979 (0.907)	-0.6647** (0.283)	0.1913 (0.855)	-0.5596** (0.28)	0.1367 (0.903)
Gini Coefficient (-) (adjusted, smoothed)	0.0008 (0.001)	-0.001 (0.003)	0.0011 (0.001)	-0.0008 (0.003)	0.0013 (0.001)	-0.0018 (0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0042 (0.006)	-0.0094 (0.021)	-0.0021 (0.005)	-0.0016 (0.019)	-0.0021 (0.005)	-0.0121 (0.021)
constant	-0.5583 (0.39)	-0.0739 (0.456)	-0.5259 (0.391)	-0.1483 (0.448)	-0.2184 (0.479)	0.0473 (0.361)
R-squared	0.9330	0.8565	0.9375	0.8726	0.9395	0.8722
Adjusted R-squared	0.9112	0.7919	0.9169	0.8147	0.9194	0.8136
F-Statistic	845.70	3951.29	920.78	2285.78	1063.50	2086.77
F-Stat df 1	47	51	47	50	47	50
F-Stat df 2	148	122	146	121	144	120
Number of Countries	17	24	17	24	17	24
Number of Observations	197	178	195	177	193	176

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A2a

Sensitivity Analysis : Tax Smoothing Variables (OLS Estimated Growth Rate)

Fixed (Country & Time) Effects Panel Regressions -- Missing Data Technique

Dependent Variable: Central Government Budget Surplus Share

	Number of Previous Years Used in Estimating Growth Rate					
	4 years		6 years		8 years	
Years : 1972 -1992	Developed TS MD Reg 4a	Developing TS MD Reg 4b	Developed TS MD Reg 5a	Developing TS MD Reg 5b	Developed TS MD Reg 6a	Developing TS MD Reg 6b
Control Variables						
Dependent Variable Lag 1	0.4173***	0.6695***	0.4229***	0.5920***	0.4203***	0.6511***
	(0.133)	(0.083)	(0.141)	(0.089)	(0.138)	(0.096)
Index of Political Rights	0.0216**	0.0003	0.0218**	0.0013	0.0228**	0.0031*
	(0.009)	(0.002)	(0.009)	(0.002)	(0.009)	(0.002)
Agricultural Share (-)	-0.109	-0.0871	-0.0741	-0.0374	-0.0772	-0.0687
	(0.277)	(0.077)	(0.281)	(0.087)	(0.286)	(0.095)
Manufacturing Share (+)	0.2781	-0.2179	0.2636	-0.1917	0.2769	-0.135
	(0.212)	(0.218)	(0.217)	(0.213)	(0.215)	(0.165)
Trade Share (+)	-0.0109	0.0497**	-0.0087	0.0495**	-0.0073	0.032*
	(0.053)	(0.025)	(0.054)	(0.024)	(0.055)	(0.017)
Urban Population Share (+)	-0.0148***	-0.0035***	-0.0144***	-0.0031***	-0.0138***	-0.0027***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
Log of per capita real GDP (+)	0.2166***	0.0614***	0.2191***	0.0615***	0.2264***	0.0467***
	(0.047)	(0.018)	(0.051)	(0.019)	(0.051)	(0.015)
Government Crises (-)	-0.0005	-0.0004	-0.0009	-0.0002	-0.001	-0.0003
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cost of Debt Servicing (-)	0.0194	0.007	0.0307	-0.0055	0.029	0.0074
	(0.064)	(0.028)	(0.063)	(0.028)	(0.064)	(0.029)
Seigniorage (-)	-0.0962	-0.1352	-0.0735	-0.1664*	-0.0672	-0.1458*
	(0.102)	(0.082)	(0.098)	(0.085)	(0.096)	(0.086)
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt expenditure (-)	-0.0500*	-0.0833***	-0.0659**	-0.0752***	-0.0792**	-0.1341***
	(0.027)	(0.022)	(0.033)	(0.028)	(0.035)	(0.038)
Unanticipated changes in per capita real GDP (+)	-0.0731	0.0959***	-0.0656	0.0794***	-0.0723	0.1175***
	(0.05)	(0.026)	(0.068)	(0.028)	(0.074)	(0.034)
Bequest-Motives Variables						
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7423**	-0.3809	-0.758**	-0.2311	-0.7239*	-0.1311
	(0.318)	(0.448)	(0.339)	(0.44)	(0.381)	(0.433)
Gini Coefficient (-) (adjusted, smoothed)	0.0008	-0.001	0.0011	-0.0008	0.0012	-0.0018
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0118	-0.0242**	-0.0101	-0.0232*	-0.0091	-0.0142
	(0.008)	(0.011)	(0.009)	(0.012)	(0.008)	(0.01)
constant	-1.0355***	0.1182	-1.114***	-0.0937	-1.2382***	0.0754
	(0.379)	(0.175)	(0.418)	(0.133)	(0.431)	(0.188)
R-squared	0.8701	0.8283	0.8755	0.8295	0.8745	0.8529
Adjusted R-squared	0.8395	0.7834	0.8458	0.7836	0.8438	0.8117
F-Statistic	50.84	110.40	54.31	574.63	50.28	29.83
F-Stat df 1	50	64	50	63	50	63
F-Stat df 2	212	252	208	241	204	288
Number of Countries	20	36	20	35	20	34
Number of Observations	263	319	259	307	255	293

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A2b

Sensitivity Analysis : Tax Smoothing Variables (OLS Estimated Growth Rate)

Fixed (Country & Time) Effects Panel Regressions

Dependent Variable: Central Government Budget Surplus Share

	Number of Previous Years Used in Estimating Growth Rate					
	4 years		6 years		8 years	
	Developed	Developing	Developed	Developing	Developed	Developing
Years : 1972 -1992	TS Reg 4a	TS Reg 4b	TS Reg 5a	TS Reg 5b	TS Reg 6a	TS Reg 6b
Control Variables						
Dependent Variable Lag 1	0.6936***	0.8053***	0.7342***	0.7986***	0.7245***	0.7747***
	(0.078)	(0.123)	(0.078)	(0.108)	(0.075)	(0.11)
Index of Political Rights	0.0146**	0.0038	0.0149**	0.001	0.0151**	0.001
	(0.007)	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)
Agricultural Share (-)	-0.2015	-0.0516	-0.2412	-0.0641	-0.2152	-0.083
	(0.328)	(0.123)	(0.315)	(0.125)	(0.312)	(0.13)
Manufacturing Share (+)	0.1355	-0.2617	0.1212	-0.2401	0.1257	-0.2377
	(0.15)	(0.24)	(0.147)	(0.2)	(0.148)	(0.207)
Trade Share (+)	0.0677*	0.0361	0.0521	0.0221	0.0412	0.0266
	(0.04)	(0.053)	(0.038)	(0.044)	(0.037)	(0.046)
Urban Population Share (+)	-0.0125***	-0.0001	-0.011***	-0.0004	-0.0106***	-0.0004
	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Log of per capita real GDP (+)	0.1464***	0.0314	0.1303***	0.0285	0.1274***	0.0339
	(0.041)	(0.032)	(0.04)	(0.031)	(0.041)	(0.031)
Government Crises (-)	-0.002	-0.0016	-0.0025*	-0.0016	-0.003**	-0.0023
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Cost of Debt Servicing (-)	0.0572	0.0269	0.0724	0.0132	0.077	0.0228
	(0.074)	(0.031)	(0.073)	(0.027)	(0.071)	(0.03)
Seigniorage (-)	-0.1963	-0.2222*	-0.1714	-0.1601	-0.1627	-0.173
	(0.157)	(0.118)	(0.144)	(0.105)	(0.137)	(0.112)
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt expenditure (-)	-0.0856***	-0.1433***	-0.1124***	-0.1686***	-0.124***	-0.1713***
	(0.019)	(0.033)	(0.021)	(0.032)	(0.02)	(0.034)
Unanticipated changes in per capita real GDP (+)	0.0186	0.1004**	0.065	0.1157**	0.076	0.0964*
	(0.049)	(0.05)	(0.053)	(0.047)	(0.056)	(0.054)
Bequest-Motives Variables						
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7733**	0.1073	-0.6655**	0.1563	-0.5674**	0.1407
	(0.300)	(0.915)	(0.283)	(0.828)	(0.279)	(0.871)
Gini Coefficient (-) (adjusted, smoothed)	0.0008	-0.001	0.0011	-0.0008	0.0012	-0.0018
	(0.001)	(0.003)	(0.001)	(0.003)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0043	-0.0106	-0.0023	-0.0032	-0.0021	-0.0098
	(0.006)	(0.02)	(0.005)	(0.019)	(0.005)	(0.02)
constant	-0.5698	-0.1102	-0.5471	-0.1340	-0.2416	-0.0025
	(0.389)	(0.456)	(0.388)	(0.438)	(0.475)	(0.353)
R-squared	0.9334	0.8550	0.9377	0.8769	0.9403	0.8745
Adjusted R-squared	0.9118	0.7896	0.9172	0.8210	0.9204	0.8170
F-Statistic	844.39	2036.49	947.76	2269.98	1283.22	2103.26
F-Stat df 1	47	50	47	50	47	50
F-Stat df 2	148	122	146	121	144	120
Number of Countries	17	24	17	24	17	24
Number of Observations	197	178	195	177	193	176

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A3a

Sensitivity Analysis : Expected Per Capita Growth Rate

Fixed (Country & Time) Effects Panel Regressions – Missing Data Technique

Dependent Variable: Central Government Budget Surplus Share

	Expected growth rate constructed using previous							
	15 years		20 years		25 years		30 years	
	Developed	Developing	Developed	Developing	Developed	Developing	Developed	Developing
Years : 1975 -1992	BM MD Reg 1a	BM MD Reg 1b	BM MD Reg 2a	BM MD Reg 2b	BM MD Reg 3a	BM MD Reg 3b	BM MD Reg 4a	BM MD Reg 4b
Control Variables								
Dependent Variable Lag 1	0.4716***	0.6860***	0.4725***	0.6567***	0.4137***	0.7118***	0.3723**	0.7598***
	(0.134)	(0.077)	(0.134)	(0.073)	(0.134)	(0.083)	(0.149)	(0.093)
Index of Political Rights	0.0004	0.0003	0.0006	0.0007	0.0216**	3.61E-05	0.0197*	-0.0012
	(0.003)	(0.002)	(0.004)	(0.002)	(0.009)	(0.002)	(0.012)	(0.003)
Agricultural Share (-)	-0.081	-0.0632	-0.0179	-0.1348**	-0.1161	-0.091	-0.2119	-0.0559
	(0.239)	(0.06)	(0.232)	(0.064)	(0.278)	(0.073)	(0.421)	(0.116)
Manufacturing Share (+)	0.1985	-0.1274	0.2092	-0.1826	0.2808	-0.2193	0.5289*	-0.1477
	(0.19)	(0.147)	(0.195)	(0.172)	(0.212)	(0.213)	(0.27)	(0.223)
Trade Share (+)	-0.0069	0.0349*	-0.0058	0.0472**	-0.0108	0.0486**	-0.0377	0.0479
	(0.05)	(0.019)	(0.052)	(0.02)	(0.053)	(0.025)	(0.069)	(0.03)
Urban Population Share (+)	-0.0146***	-0.0022***	-0.0145***	-0.003***	-0.0149***	-0.0035***	-0.013***	-0.0031***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)	(0.005)	(0.001)
Log of per capita real GDP (+)	0.2076***	0.0478**	0.1954***	0.0626***	0.2167***	0.0578***	0.2319***	0.0454*
	(0.042)	(0.022)	(0.044)	(0.021)	(0.047)	(0.017)	(0.055)	(0.024)
Government Crises (-)	0.0009	-0.0033	0.0004	-0.0044*	-0.0005	-0.0005	3.65E-05	0.0033
	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.003)	(0.005)
Cost of Debt Servicing (-)	-0.0005	0.0066	-0.0013	0.0167	0.0145	0.0109	-0.0042	0.0154
	(0.07)	(0.029)	(0.069)	(0.028)	(0.064)	(0.028)	(0.087)	(0.031)
Seigniorage (-)	-0.1745	-0.0856	-0.1762	-0.0549	-0.0985	-0.138*	-0.0095	-0.0873
	(0.114)	(0.091)	(0.116)	(0.09)	(0.102)	(0.08)	(0.095)	(0.089)
Tax-Smoothing Variables								
Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0539*	-0.0899***	-0.0524*	-0.0888***	-0.0468*	-0.0919***	-0.0367	-0.0982***
	(0.03)	(0.018)	(0.029)	(0.018)	(0.028)	(0.021)	(0.039)	(0.02)
Unanticipated changes in per capita real GDP (+) (4 year, simple average)	-0.0503	0.1133***	-0.0513	0.1001***	-0.0766	0.1069***	-0.077	0.0925**
	(0.048)	(0.026)	(0.047)	(0.023)	(0.053)	(0.026)	(0.063)	(0.038)
Bequest-Motives Variables								
Expected per capita real GDP Growth Rate (-)	-0.2531	-0.0352	-0.4593	-0.0405	-0.7456**	-0.3773	-0.6879	-1.4684**
	(0.277)	(0.186)	(0.314)	(0.227)	(0.318)	(0.443)	(0.523)	(0.725)
Gini Coefficient (-) (adjusted, smoothed)	0.0011*	-0.0007	0.001	-0.0001	0.0008	-0.001	-0.0002	-0.0006
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0112	-0.0067	-0.0117	-0.007	-0.0119	-0.0232**	-0.0147	-0.0427*
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.011)	(0.01)	(0.023)
constant	-0.9992***	-0.1324	-0.8853**	-0.2578**	-1.0336***	0.1347	-0.9545**	0.2379
	(0.352)	(0.100)	(0.371)	(0.120)	(0.379)	(0.173)	(0.479)	(0.303)
R-squared	0.8545	0.8015	0.8555	0.8158	0.8699	0.8338	0.8657	0.8046
Adjusted R-squared	0.8215	0.7598	0.8226	0.7733	0.8392	0.7903	0.8299	0.7454
F-Statistic	45.78	579.63	45.27	812.07	49.58	269.79	77.82	32.70
F-Stat df 1	53	70	53	68	50	64	44	53
F-Stat df 2	233	338	233	307	212	252	165	175
Number of Countries	20	38	20	38	20	36	19	28
Number of Observations	287	410	287	379	263	319	210	229

Standard Errors are in parentheses.
*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively
Robust standard errors obtained using White's correction for heteroscedasticity.

Table A3b
Sensitivity Analysis : Expected Per Capita Growth Rate
Fixed (Country & Time) Effects Panel Regressions
Dependent Variable: Central Government Budget Surplus Share

	Expected growth rate constructed using previous							
	15 years		20 years		25 years		30 years	
	Developed	Developing	Developed	Developing	Developed	Developing	Developed	Developing
Years : 1975 -1992	BM Reg 1a	BM Reg 1b	BM Reg 2a	BM Reg 2b	BM Reg 3a	BM Reg 3b	BM Reg 4a	BM Reg 4b
Control Variables								
Dependent Variable Lag 1	0.7186***	0.7980***	0.7223***	0.7761***	0.6932***	0.8202***	0.6795***	0.9336***
	(0.075)	(0.099)	(0.075)	(0.104)	(0.078)	(0.12)	(0.082)	(0.15)
Index of Political Rights	0.0169***	0.0049*	0.0161**	0.0044	0.0144**	0.0036	0.0117	0.0034
	(0.006)	(0.003)	(0.007)	(0.003)	(0.007)	(0.003)	(0.009)	(0.005)
Agricultural Share (-)	-0.135	0.0223	-0.1301	-0.0553	-0.208	-0.0686	-0.3732	0.1328
	(0.239)	(0.089)	(0.238)	(0.109)	(0.331)	(0.125)	(0.451)	(0.256)
Manufacturing Share (+)	-0.0358	-0.2813*	-0.0159	-0.3164*	0.1358	-0.2578	0.3824*	-0.2874
	(0.136)	(0.167)	(0.135)	(0.179)	(0.15)	(0.24)	(0.211)	(0.272)
Trade Share (+)	0.0605*	0.0479*	0.068*	0.0457*	0.0675*	0.0337	0.0878*	0.0505
	(0.036)	(0.025)	(0.037)	(0.025)	(0.041)	(0.052)	(0.051)	(0.067)
Urban Population Share (+)	-0.011***	0.0001	-0.0091***	0.0007	-0.0125***	-0.0002	-0.0078	0.0017
	(0.003)	(0.001)	(0.003)	(0.001)	(0.004)	(0.002)	(0.005)	(0.003)
Log of per capita real GDP (+)	0.1619***	0.0313	0.1423***	0.0233	0.1451***	0.0279	0.1454***	0.0357
	(0.033)	(0.032)	(0.033)	(0.031)	(0.041)	(0.032)	(0.043)	(0.05)
Government Crises (-)	-0.0009	-0.002	-0.0013	-0.0028	-0.0021	-0.0017	-0.0014	-0.018
	(0.001)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.037)
Cost of Debt Servicing (-)	0.0219	0.0217	0.0214	0.031	0.0572	0.0303	0.0798	0.0421
	(0.068)	(0.028)	(0.069)	(0.029)	(0.074)	(0.032)	(0.104)	(0.037)
Seigniorage (-)	-0.2305	-0.2041*	-0.2371	-0.1795	-0.1977	-0.214*	-0.1252	-0.1625
	(0.176)	(0.111)	(0.175)	(0.11)	(0.157)	(0.115)	(0.15)	(0.131)
Tax-Smoothing Variables								
Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0862***	-0.1332***	-0.0881***	-0.1355***	-0.0843***	-0.1484***	-0.0905***	-0.1592***
	(0.02)	(0.031)	(0.02)	(0.033)	(0.019)	(0.033)	(0.032)	(0.037)
Unanticipated changes in per capita real GDP (+) (4 year, simple average)	0.0124	0.0997**	0.0301	0.0977**	0.0201	0.1111**	0.0473	0.11*
	(0.043)	(0.039)	(0.043)	(0.043)	(0.049)	(0.05)	(0.059)	(0.065)
Bequest-Motives Variables								
Expected per capita real GDP Growth Rate (-)	-0.7244***	0.0654	-0.6786***	0.2332	-0.7806**	0.0979	-0.985**	0.3324
	(0.24)	(0.289)	(0.258)	(0.362)	(0.302)	(0.907)	(0.442)	(1.779)
Gini Coefficient (-) (adjusted, smoothed)	0.0011*	-0.0007	0.001	-0.0001	0.0008	-0.001	-0.0002	-0.0006
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0072	-0.0085	-0.0036	-0.0204	-0.0042	-0.0094	-0.0011	-0.0109
	(0.005)	(0.012)	(0.005)	(0.017)	(0.006)	(0.021)	(0.007)	(0.03)
constant	-0.4212	-0.1463	-0.4826	-0.0134	-0.5583	-0.0739	-0.7660	-0.1399
	(0.350)	(0.197)	(0.382)	(0.29)	(0.39)	(0.456)	(0.637)	(0.522)
R-squared	0.9292	0.8432	0.9285	0.8540	0.9330	0.8565	0.9405	0.8502
Adjusted R-squared	0.9071	0.7876	0.9061	0.7979	0.9112	0.7919	0.9178	0.7718
F-Statistic	1557.35	348.77	1222.30	459.02	845.70	3951.29	802.83	22.94
F-Stat df 1	50	54	50	53	47	51	41	43
F-Stat df 2	163	169	163	151	148	122	110	86
Number of Countries	17	26	17	25	17	24	16	20
Number of Observations	215	230	215	210	197	178	153	132

Standard Errors are in parentheses.
*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively
Robust standard errors obtained using White's correction for heteroscedasticity.

Table A4a
Sensitivity Analysis : Gini Coefficient
Fixed (Country & Time) Effects Panel Regressions -- Missing Data Technique
Dependent Variable: Central Government Budget Surplus Share

	Using Various Measures of Gini Coefficient					
	Unadjusted		Adjusted		Adjusted and Smoothed	
	Developed	Developing	Developed	Developing	Developed	Developing
Years : 1975 -1992	BM MD Reg 5a	BM MD Reg 5b	BM MD Reg 6a	BM MD Reg 6b	BM MD Reg 7a	BM MD Reg 7b
Control Variables						
Dependent Variable Lag 1	0.4107***	0.7177***	0.4107***	0.7165***	0.4137***	0.7118***
	(0.134)	(0.083)	(0.134)	(0.083)	(0.134)	(0.083)
Index of Political Rights	0.0211**	-0.0002	0.0211**	-0.0002	0.0216**	3.61E-05
	(0.009)	(0.002)	(0.009)	(0.002)	(0.009)	(0.002)
Agricultural Share (-)	-0.1224	-0.0942	-0.1224	-0.0945	-0.1161	-0.091
	(0.279)	(0.074)	(0.279)	(0.074)	(0.278)	(0.073)
Manufacturing Share (+)	0.2866	-0.2176	0.2866	-0.2174	0.2808	-0.2193
	(0.212)	(0.213)	(0.212)	(0.213)	(0.212)	(0.213)
Trade Share (+)	-0.0111	0.0496**	-0.0111	0.0497**	-0.0108	0.0486**
	(0.053)	(0.024)	(0.053)	(0.025)	(0.053)	(0.025)
Urban Population Share (+)	-0.0154***	-0.003***	-0.0154***	-0.003***	-0.0149***	-0.0035***
	(0.004)	(0.001)	(0.004)	(0.001)	(0.004)	(0.001)
Log of per capita Real GDP	0.2189***	0.0501***	0.2189***	0.0505***	0.2167***	0.0578***
	(0.047)	(0.018)	(0.047)	(0.018)	(0.047)	(0.017)
Government Crises (-)	-0.0004	-0.0002	-0.0004	-0.0003	-0.0005	-0.0005
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Cost of Debt Servicing (-)	0.017	0.0115	0.017	0.0117	0.0145	0.0109
	(0.065)	(0.028)	(0.065)	(0.028)	(0.064)	(0.028)
Seigniorage (-)	-0.1016	-0.1206	-0.1016	-0.1203	-0.0985	-0.138*
	(0.103)	(0.08)	(0.103)	(0.08)	(0.102)	(0.08)
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0471*	-0.0919***	-0.0471*	-0.0919***	-0.0468*	-0.0919***
	(0.028)	(0.021)	(0.028)	(0.021)	(0.028)	(0.021)
Unanticipated changes in per capita real GDP (+) (4 year, simple average)	-0.0761	0.1084***	-0.0761	0.1083***	-0.0766	0.1069***
	(0.053)	(0.026)	(0.053)	(0.026)	(0.053)	(0.026)
Bequest-Motives Variables						
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7425**	-0.1356	-0.7425**	-0.1391	-0.7456**	-0.3773
	(0.317)	(0.442)	(0.317)	(0.442)	(0.318)	(0.443)
Gini Coefficient (-)	0.0007	0.0003	0.0007	0.0003	0.0008	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0125	-0.0237**	-0.0125	-0.0233**	-0.0119	-0.0232**
	(0.008)	(0.011)	(0.008)	(0.011)	(0.008)	(0.011)
constant	-1.0133***	0.0954	-1.0133***	0.0818	-1.0336***	0.1347
	(0.378)	(0.172)	(0.378)	(0.172)	(0.379)	(0.173)
R-squared	0.8650	0.8326	0.8658	0.8330	0.8699	0.8338
Adjusted R-squared	0.8331	0.7888	0.8342	0.7893	0.8392	0.7903
F-Statistic	48.27	279.95	48.28	280.29	49.58	269.79
F-Stat df 1	50	64	50	64	50	64
F-Stat df 2	212	252	212	252	212	252
Number of Countries	20	36	20	36	20	36
Number of Observations	263	319	263	319	263	319

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A4b
Sensitivity Analysis : Gini Coefficient
Fixed (Country & Time) Effects Panel Regressions
Dependent Variable: Central Government Budget Surplus Share

	Using Various Measures of Gini Coefficient					
	Unadjusted		Adjusted		Adjusted and Smoothed	
Years : 1975 -1992	Developed BM Reg 5a	Developing BM Reg 5b	Developed BM Reg 6a	Developing BM Reg 6b	Developed BM Reg 7a	Developing BM Reg 7b
Control Variables						
Dependent Variable Lag 1	0.6902***	0.8261***	0.6902***	0.8249***	0.6932***	0.8202***
	(0.078)	(0.124)	(0.078)	(0.122)	(0.078)	(0.12)
Index of Political Rights	0.0139**	0.0034	0.0139**	0.0034	0.0144**	0.0036
	(0.007)	(0.003)	(0.007)	(0.003)	(0.007)	(0.003)
Agricultural Share (-)	-0.2143	-0.0718	-0.2143	-0.072	-0.208	-0.0686
	(0.326)	(0.126)	(0.326)	(0.127)	(0.331)	(0.125)
Manufacturing Share (+)	0.1416	-0.2561	0.1416	-0.2558	0.1358	-0.2578
	(0.152)	(0.236)	(0.152)	(0.235)	(0.15)	(0.24)
Trade Share (+)	0.0671*	0.0346	0.0671*	0.0348	0.0675*	0.0337
	(0.04)	(0.051)	(0.04)	(0.052)	(0.041)	(0.052)
Urban Population Share (+)	-0.013***	0.0003	-0.013***	0.0003	-0.0125***	-0.0002
	(0.003)	(0.001)	(0.003)	(0.002)	(0.004)	(0.002)
Log of per capita Real GDP	0.1473***	0.0202	0.1473***	0.0207	0.1451***	0.0279
	(0.039)	(0.028)	(0.039)	(0.029)	(0.041)	(0.032)
Government Crises (-)	-0.002	-0.0014	-0.002	-0.0014	-0.0021	-0.0017
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Cost of Debt Servicing (-)	0.0597	0.0309	0.0597	0.0311	0.0572	0.0303
	(0.074)	(0.031)	(0.074)	(0.032)	(0.074)	(0.032)
Seigniorage (-)	-0.2008	-0.1966*	-0.2008	-0.1963*	-0.1977	-0.214*
	(0.157)	(0.114)	(0.157)	(0.115)	(0.157)	(0.115)
Tax-Smoothing Variables						
Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0846***	-0.1484***	-0.0846***	-0.1484***	-0.0843***	-0.1484***
	(0.019)	(0.033)	(0.019)	(0.033)	(0.019)	(0.033)
Unanticipated changes in per capita real GDP (+) (4 year, simple average)	0.0207	0.1126**	0.0207	0.1125**	0.0201	0.1111**
	(0.049)	(0.051)	(0.049)	(0.050)	(0.049)	(0.05)
Bequest-Motives Variables						
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7775***	0.3396	-0.7775***	0.336	-0.7806**	0.0979
	(0.296)	(0.824)	(0.296)	(0.867)	(0.302)	(0.907)
Gini Coefficient (-)	0.0007	0.0003	0.0007	0.0003	0.0008	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.003)
Life Expectancy at age 65 (-) (estimated by Method 2)	-0.0048	-0.0099	-0.0048	-0.0095	-0.0042	-0.0094
	(0.006)	(0.021)	(0.006)	(0.021)	(0.006)	(0.021)
constant	-0.6384	-0.1144	-0.6384	-0.1279	-0.5583	-0.0739
	(0.390)	(0.435)	(0.390)	(0.451)	(0.39)	(0.456)
R-squared	0.9331	0.8564	0.9331	0.8564	0.9330	0.8565
Adjusted R-squared	0.9114	0.7917	0.9114	0.7917	0.9112	0.7919
F-Statistic	837.21	8520.10	837.21	1949.96	845.70	3951.29
F-Stat df 1	47	51	47	50	47	51
F-Stat df 2	148	122	148	122	148	122
Number of Countries	17	24	17	24	17	24
Number of Observations	197	178	197	178	197	178

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A5a

Sensitivity Analysis: Using Various Measures of Expected Longevity

Fixed (Country & Time) Effects Panel Regressions – Missing Data Technique

Dependent Variable: Central Government Budget Surplus Share

	Using Various Measures of Expected Longevity							
	Life Expectancy at Birth		Life Expectancy at age 65		Estimated Life Expectancy at age 65 (Method 1)		Estimated Life Expectancy at age 65 (Method 2)	
	Developed	Developing	Developed	Developing	Developed	Developing	Developed	Developing
Years : 1975 -1992	BM MD Reg 8a	BM MD Reg 8b	BM MD Reg 9a	BM MD Reg 9b	BM MD Reg 10a	BM MD Reg 10b	BM MD Reg 11a	BM MD Reg 11b
Control Variables								
Dependent Variable Lag 1	0.4189***	0.6889***	0.6198***	0.3427*	0.4115***	0.7096***	0.4137***	0.7118***
	(0.132)	(0.086)	(0.07)	(0.194)	(0.133)	(0.083)	(0.134)	(0 083)
Index of Political Rights	0.0217**	0.0002	0.0192***	0.0005	0.0213**	3.30E-05	0.0216**	3 61E-05
	(0.009)	(0.002)	(0.007)	(0.003)	(0.009)	(0.002)	(0.009)	(0.002)
Agricultural Share (-)	-0.0873	-0.0764	-0.1581	0.0599	-0.0974	-0.0882	-0.1161	-0.091
	(0.277)	(0.075)	(0.256)	(0.145)	(0.277)	(0.073)	(0.278)	(0.073)
Manufacturing Share (+)	0.2477	-0.1497	0.3102**	0.6121**	0.2386	-0.2194	0.2808	-0.2193
	(0.202)	(0.185)	(0.14)	(0.243)	(0.2)	(0.213)	(0.212)	(0.213)
Trade Share (+)	-0.0053	0.0407*	0.0336	-0.048	-0.0043	0.0478*	-0.0108	0.0486**
	(0.055)	(0.022)	(0.028)	(0.046)	(0.055)	(0.024)	(0.053)	(0.025)
Urban Population Share (+)	-0.0148***	-0.0037***	-0.0136***	-0.0005	-0.0152***	-0.0035***	-0.0149***	-0 0035***
	(0.004)	(0.001)	(0.003)	(0.002)	(0.004)	(0.001)	(0.004)	(0.001)
Log of per capita Real GDP	0.2112***	0.0598***	0.1566***	0.0588**	0.2151***	0.0585***	0.2167***	0.0578***
	(0.045)	(0.017)	(0.035)	(0.026)	(0.046)	(0.018)	(0.047)	(0.017)
Government Crises (-)	-0.0007	-0.0014	-0.0012	0.004	-0.0007	-0.0005	-0 0005	-0.0005
	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.002)	(0 001)	(0.002)
Cost of Debt Servicing (-)	0.0177	0.0076	-0.0048	0.045	0.0146	0.0114	0.0145	0.0109
	(0.065)	(0.028)	(0.061)	(0.041)	(0.065)	(0.028)	(0.064)	(0.028)
Seigniorage (-)	-0.0978	-0.1391*	-0.1151	-0.1241	-0.0938	-0.1383*	-0.0985	-0 138*
	(0.102)	(0.08)	(0.106)	(0.106)	(0.102)	(0.08)	(0.102)	(0 08)
Tax-Smoothing Variables								
Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0469*	-0.0879***	-0.0709***	-0.0556*	-0.0469*	-0.0918***	-0.0468*	-0.0919***
	(0.028)	(0.02)	(0.024)	(0.033)	(0.028)	(0.021)	(0.028)	(0.021)
Unanticipated changes in per capita real GDP (+) (4 year, simple average)	-0.0737	0.1032***	-0.0274	0.0674	-0.0754	0.1066***	-0 0766	0.1069***
	(0.053)	(0.025)	(0.041)	(0.046)	(0.053)	(0.026)	(0.053)	(0 026)
Bequest-Motives Variables								
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7213**	-0.1835	-1.1383***	-1.6807*	-0.6919**	-0.4034	-0.7456**	-0 3773
	(0.318)	(0.504)	(0.32)	(0.986)	(0.313)	(0.442)	(0.318)	(0.443)
Gini Coefficient (-) (adjusted, smoothed)	0.0008	-0.0019	0.0001	-0.0006	0.0009	-0.001	0.0008	-0.001
	(0.001)	(0.003)	(0.001)	(0.005)	(0.001)	(0.003)	(0.001)	(0.003)
Expectancy Longevity (-)	-0.0055	0.0088*	-0.0077**	-0.0004	-0.0129	-0.0226**	-0.0119	-0.0232**
	(0.005)	(0.005)	(0.003)	(0.008)	(0.009)	(0.01)	(0.008)	(0.011)
constant	-0.7716	-0.7534*	-0.6116**	-0.3303	-0.9933**	0.1305	-1.0336***	0.1347
	(0.535)	(0.419)	(0.289)	(0.258)	(0.397)	(0.17)	(0 379)	(0.173)
R-squared	0.8708	0.8454	0.9106	0.8098	0.8707	0.8344	0 8699	0.8338
Adjusted R-squared	0.8403	0.8049	0.8882	0.7007	0.8402	0.7911	0 8392	0.7903
F-Statistic	48.57	69.31	54.47	14.65	48.98	290.79	49.58	269.79
F-Stat df 1	50	64	50	46	50	64	50	64
F-Stat df 2	212	252	200	82	212	319	212	252
Number of Countries	20	36	20	17	20	36	20	36
Number of Observations	263	319	251	130	263	319	263	319

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A5b

Sensitivity Analysis: Using Various Measures of Expected Longevity

Fixed (Country & Time) Effects Panel Regressions

Dependent Variable: Central Government Budget Surplus Share

	Using Various Measures of Expected Longevity							
	Life Expectancy at Birth		Life Expectancy at age 65		Estimated Life Expectancy at age 65 (Method 1)		Estimated Life Expectancy at age 65 (Method 2)	
Years : 1975 -1992	Developed BM Reg 8a	Developing BM Reg 8b	Developed BM Reg 9a	Developing BM Reg 9b	Developed BM Reg 10a	Developing BM Reg 10b	Developed BM Reg 11a	Developing BM Reg 11b
Control Variables								
Dependent Variable Lag 1	0.7023*** (0.076)	0.7984*** (0.118)	0.6771*** (0.077)	0.4874** (0.235)	0.7016*** (0.076)	0.8186*** (0.12)	0.6932*** (0.078)	0.8202*** (0.12)
Index of Political Rights	0.015** (0.007)	0.005 (0.003)	0.0158** (0.007)	-0.0061 (0.005)	0.0149** (0.007)	0.0036 (0.003)	0.0144** (0.007)	0.0036 (0.003)
Agricultural Share (-)	-0.1925 (0.331)	-0.0494 (0.122)	-0.3088 (0.338)	-0.4728** (0.217)	-0.1931 (0.331)	-0.0685 (0.125)	-0.208 (0.331)	-0.0686 (0.125)
Manufacturing Share (+)	0.1205 (0.148)	-0.2148 (0.209)	0.2247 (0.161)	-0.0652 (0.328)	0.1205 (0.148)	-0.2579 (0.24)	0.1358 (0.15)	-0.2578 (0.24)
Trade Share (+)	0.0691* (0.04)	0.0279 (0.047)	0.0692* (0.04)	0.062 (0.071)	0.069* (0.04)	0.0336 (0.052)	0.0675* (0.041)	0.0337 (0.052)
Urban Population Share (+)	-0.0116*** (0.004)	-0.0006 (0.002)	-0.0131*** (0.003)	0.0003 (0.004)	-0.0117*** (0.004)	-0.0002 (0.002)	-0.0125*** (0.004)	-0.0002 (0.002)
Log of per capita Real GDP	0.1411*** (0.04)	0.031 (0.033)	0.1442*** (0.039)	-0.0541 (0.055)	0.1414*** (0.04)	0.028 (0.032)	0.1451*** (0.041)	0.0279 (0.032)
Government Crises (-)	-0.002 (0.001)	-0.0017 (0.002)	-0.0015 (0.001)	-0.0057* (0.003)	-0.002 (0.001)	-0.0017 (0.002)	-0.0021 (0.001)	-0.0017 (0.002)
Cost of Debt Servicing (-)	0.0603 (0.075)	0.0279 (0.032)	0.0165 (0.071)	0.1187** (0.052)	0.06 (0.075)	0.0307 (0.032)	0.0572 (0.074)	0.0303 (0.032)
Seigniorage (-)	-0.1966 (0.157)	-0.209* (0.12)	-0.1934 (0.157)	-0.1566 (0.125)	-0.1967 (0.157)	-0.2155* (0.115)	-0.1977 (0.157)	-0.214* (0.115)
Tax-Smoothing Variables								
Unanticipated changes in real per capita govt exp (-) (4 year, simple average)	-0.0851*** (0.02)	-0.1434*** (0.03)	-0.0853*** (0.02)	-0.1074*** (0.03)	-0.0851*** (0.02)	-0.1482*** (0.033)	-0.0843*** (0.019)	-0.1484*** (0.033)
Unanticipated changes in per capita real GDP (+) (4 year, simple average)	0.0251 (0.049)	0.1085** (0.052)	0.0095 (0.047)	0.1411 (0.084)	0.0247 (0.049)	0.1111** (0.05)	0.0201 (0.049)	0.1111** (0.05)
Bequest-Motives Variables								
Expected per capita real GDP Growth Rate (-) (25 year construction)	-0.7528** (0.305)	-0.1997 (0.812)	-0.9733*** (0.325)	2.4799 (2.043)	-0.751** (0.306)	0.0867 (0.896)	-0.7806** (0.302)	0.0979 (0.907)
Gini Coefficient (-) (adjusted, smoothed)	0.0008 (0.001)	-0.0019 (0.003)	0.0001 (0.001)	-0.0006 (0.005)	0.0009 (0.001)	-0.001 (0.003)	0.0008 (0.001)	-0.001 (0.003)
Expectancy Longevity (-)	-0.0007 (0.003)	0.0067 (0.007)	-0.0053 (0.003)	-0.0072 (0.012)	-0.0015 (0.007)	-0.0102 (0.02)	-0.0042 (0.006)	-0.0094 (0.021)
constant	-0.5952 (0.461)	-0.6034 (0.692)	-0.4214 (0.404)	0.2731 (0.777)	-0.6237 (0.401)	-0.0590 (0.449)	-0.5583 (0.39)	-0.0739 (0.456)
R-squared	0.9327	0.8585	0.9374	0.8762	0.9327	0.8566	0.9330	0.8565
Adjusted R-squared	0.9109	0.7948	0.9162	0.7289	0.9109	0.7920	0.9112	0.7919
F-Statistic	852.02	1179.83	820.55	24.77	847.44	7834.95	845.70	3951.29
F-Stat df 1	47	50	47	40	47	51	47	51
F-Stat df 2	148	122	142	37	148	122	148	122
Number of Countries	17	24	17	13	17	24	17	24
Number of Observations	197	178	191	82	197	178	197	178

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Robust standard errors obtained using White's correction for heteroscedasticity.

Table A6a
OLS Regressions for Estimating Life Expectancy at Age 65
Method 1

Dependent Variable :	Life Expectancy at Birth less than or equal to 70 years					Life Expectancy at Birth greater than 70 years				
Life Expectancy at Age 65	1950-59	1960-69	1970-79	1980-89	1990-97	1950-59	1960-69	1970-79	1980-89	1990-97
Life expectancy at birth	0.1102*** (0.0076)	0.0752*** (0.0097)	0.0896*** (0.0260)	0.1656*** (0.0437)	0.0988*** (0.0260)	0.3959*** (0.0704)	0.4105*** (0.0334)	0.5109*** (0.0345)	0.5180*** (0.0321)	0.4609*** (0.0314)
constant	6.0267*** (0.4669)	8.3127*** (0.5944)	7.9439*** (1.6109)	2.7567*** (2.7964)	7.5100*** (1.7157)	-13.7607*** (5.0781)	-15.0343*** (2.4102)	-22.3203*** (2.5237)	-22.9241*** (2.4003)	-18.4037*** (2.3992)
R-squared	0.6158	0.3912	0.2201	0.2421	0.3480	0.3782	0.6234	0.6050	0.5914	0.6825
Adjusted R-squared	0.6129	0.3847	0.2016	0.2252	0.3238	0.3663	0.6193	0.6022	0.5891	0.6793
F-Statistic	209.98	59.76	11.86	14.37	14.41	31.63	150.64	219.03	261.98	214.92
F-Stat df 1	1	1	1	1	1	1	1	1	1	1
F-Stat df 2	131	93	42	45	27	52	91	143	181	100
Number of Observations	133	95	44	47	29	54	93	145	183	102

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Table A6b
OLS Regressions for Estimating Life Expectancy at Age 65
Method 2

Dependent Variable :	Life Expectancy at Birth less than or equal to 70 years					Life Expectancy at Birth greater than 70 years		
Life Expectancy at Age 65	1950-59	1960-69	1970-79	1980-89	1990-97	1950-79	1980-89	1990-97
Life expectancy at birth	0.1102*** (0.0076)	0.0752*** (0.0097)	0.0896*** (0.0260)	0.1656*** (0.0437)	0.0988*** (0.0260)	0.4644*** (0.0704)	-7.2842*** (1.9910)	-4.1358*** (1.5799)
(Life expectancy at birth)^2							0.0522*** (0.0133)	0.0304*** (0.0105)
constant	6.0267*** (0.4669)	8.3127*** (0.5944)	7.9439*** (1.6109)	2.7567*** (2.7964)	7.5100*** (1.7157)	-13.7607*** (5.0781)	268.2128*** (74.3211)	155.0159** (59.6366)
R-squared	0.6158	0.3912	0.2201	0.2421	0.3480	0.3782	0.6235	0.7075
Adjusted R-squared	0.6129	0.3847	0.2016	0.2252	0.3238	0.3663	0.6193	0.7016
F-Statistic	209.98	59.76	11.86	14.37	14.41	31.63	149.06	119.72
F-Stat df 1	1	1	1	1	1	1	2	1
F-Stat df 2	131	93	42	45	27	52	180	100
Number of Observations	133	95	44	47	29	54	183	102

Standard Errors are in parentheses.

*, **, *** denotes significance at the 90, 95 and 99 percent confidence level respectively

Figure A1
Lowess Plot of Life Expectancy at Age 65 against Life Expectancy at Birth
(1950-1997)

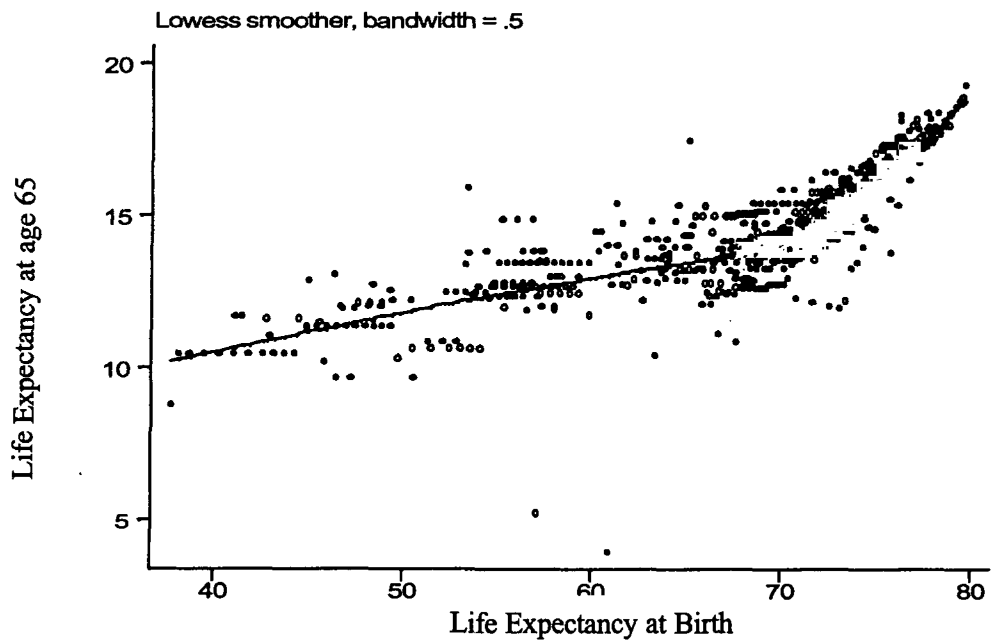


Figure A1a
Lowess Plot of Life Expectancy at Age 65 against Life Expectancy at Birth
(1950-1959)

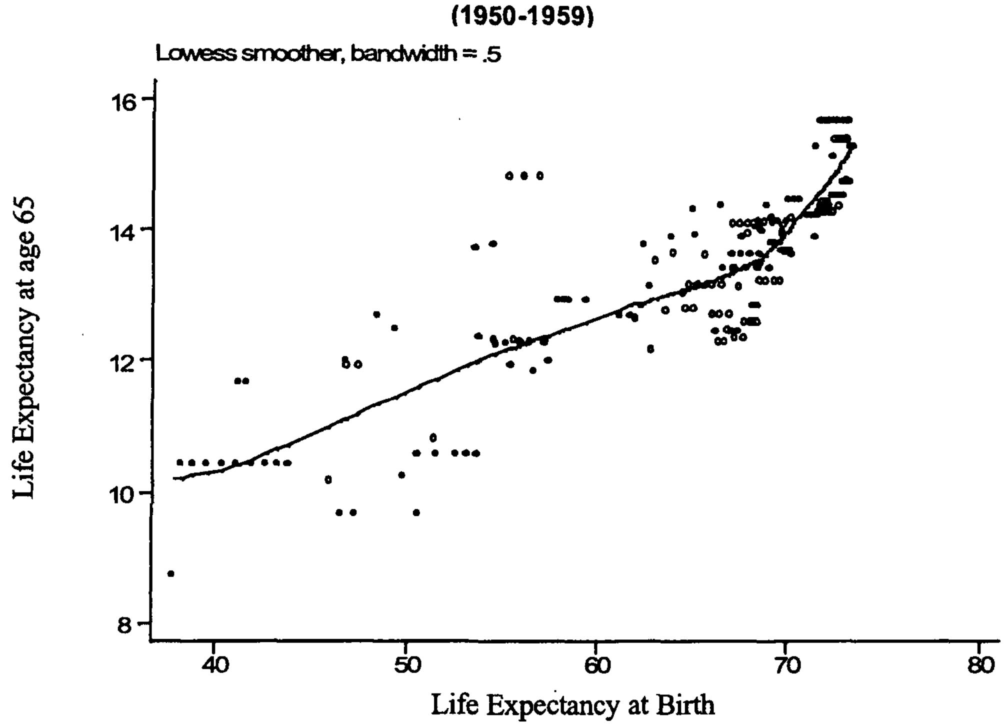


Figure A1b
Lowess Plot of Life Expectancy at Age 65 against Life Expectancy at Birth
(1960-1969)

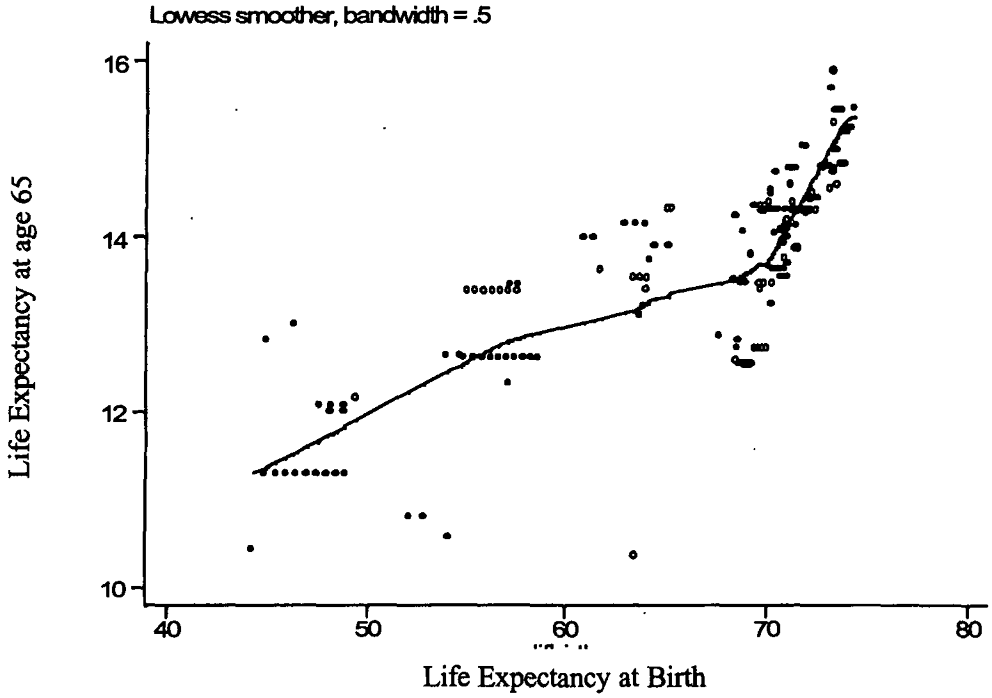


Figure A1c
Lowess Plot of Life Expectancy at Age 65 against Life Expectancy at Birth
(1970-1979)

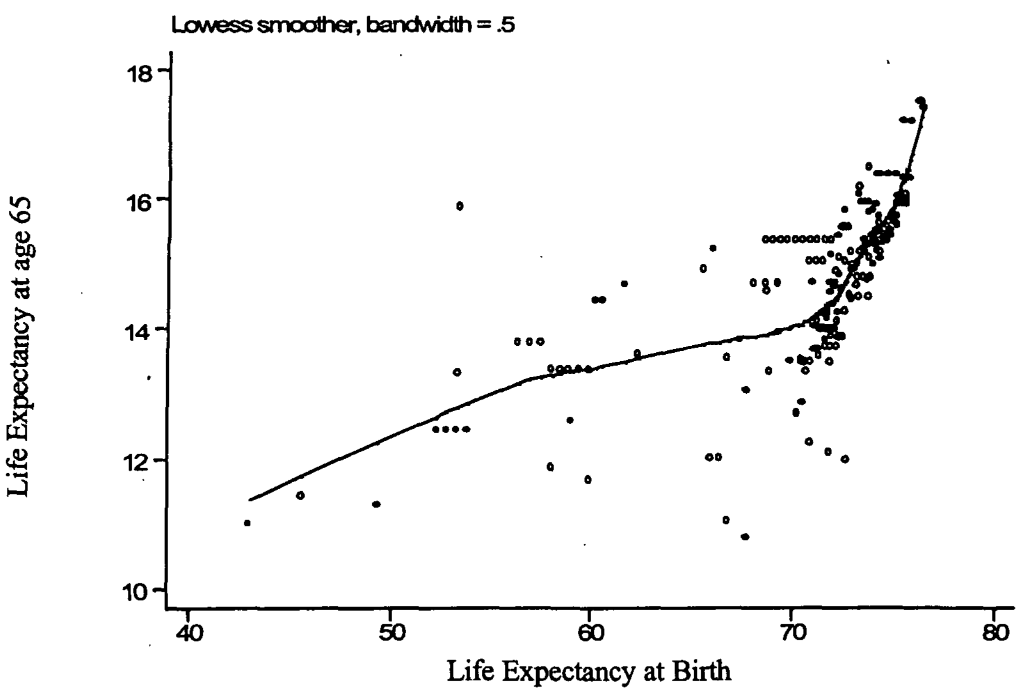


Figure A1d
Lowess Plot of Life Expectancy at Age 65 against Life Expectancy at Birth
(1980-1989)

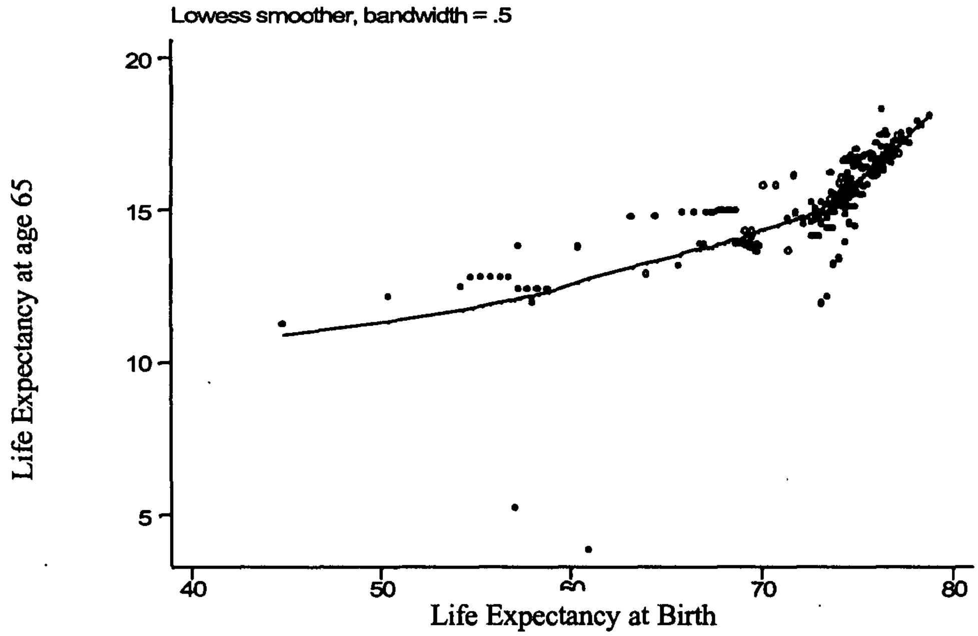
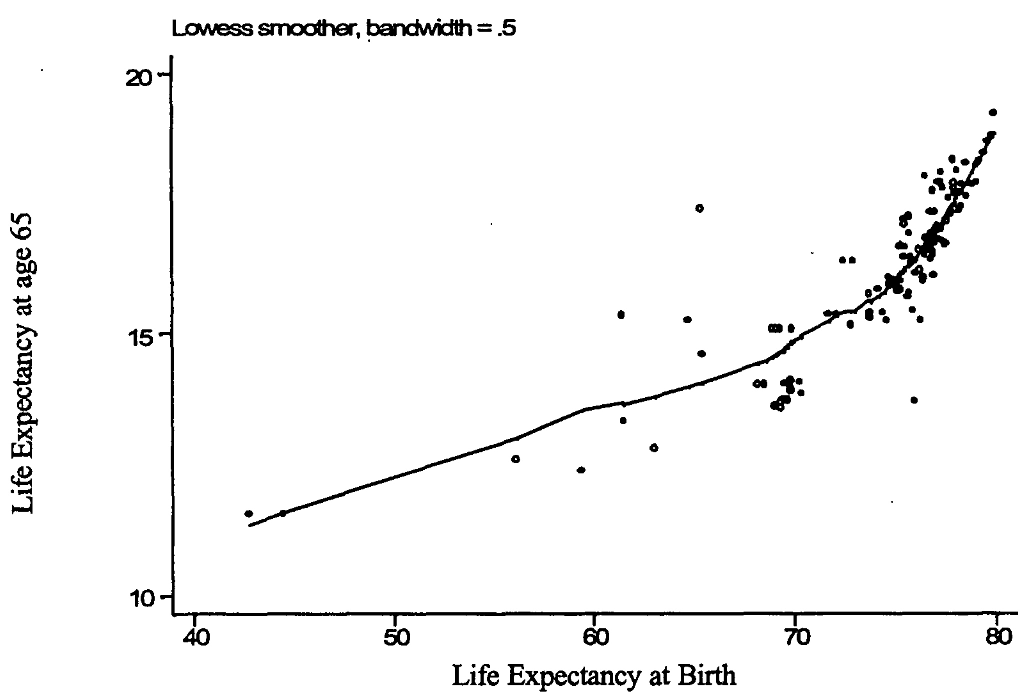


Figure A1e
Lowess Plot of Life Expectancy at Age 65 against Life Expectancy at Birth
(1990-1997)



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